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# Geriatrics

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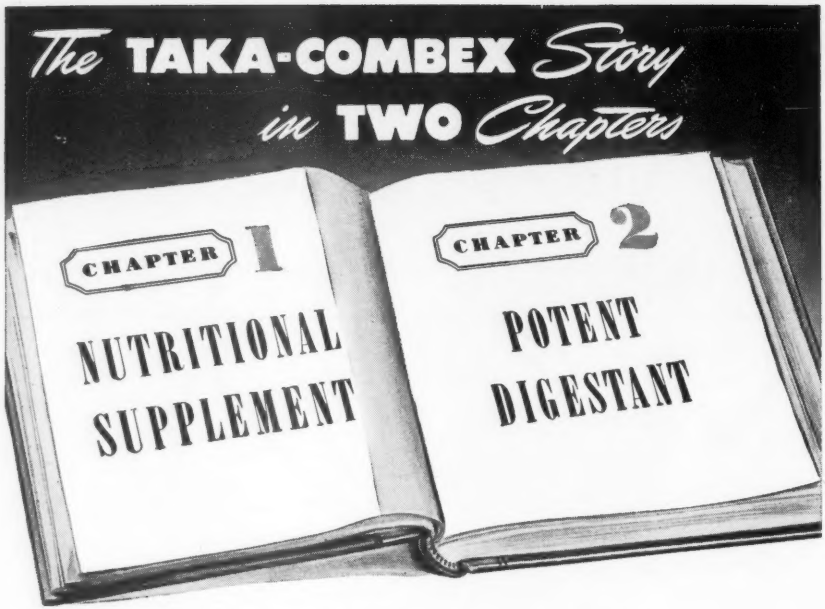


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# THE MANAGEMENT OF PARENTERAL FLUIDS IN GERIATRICS

C. Everett Koop, M.D.

THE management of fluid balance and blood replacement at both ends of the life span requires specialized knowledge. The margin of safety in the infant is very small, and pediatricians realize that the child cannot be handled as a miniature adult. A similar realization of the special problems of the elderly individual has been slower in developing. However, even as pediatric surgery has made striking advances in the past decade, so, too, major surgery has been successfully performed on older and older patients with results which are indeed encouraging. A knowledge of certain factors in hemodynamics, as well as in fluid therapy, is necessary if the progress made in geriatric surgery is to continue.

Of the special problems that confront the surgeon concerned with the care of the aged, those affecting the cardiovascular system are probably the most important. The elderly individual not only has an increased tendency to respond to trauma and hemorrhage with a shocklike reaction, but he withstands less well periods of hypotension. The decrease in the ability of the vascular system to adjust to changes in blood volume requires an earlier replacement of fluid losses in the aged. An example is the condition in which an elderly patient develops myocardial infarction during the hypotensive state associated with hemorrhage from peptic ulcer.

In addition to his inability to adjust to a reduced blood volume, the patient in the older age group may well have a decreased cardiac reserve and will therefore be unable to cope with infusions that increase his blood volume much beyond that to which he is normally accustomed. The diminished elasticity of the vascular system during periods of stress and strain is generally considered responsible in part for the increased tendency of the elderly to exhibit signs of circulatory failure with hemorrhage and trauma. The subsequent hypotension, accompanied as it is by a reduced cardiac output, is responsible for an eventual decrease in oxygenation of vital visceral

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tissues. Cerebral, cardiac, renal, and hepatic damage may result, and symptoms instituted by such change are frequently observed. Actual thrombus formation may take place with or without the presence of atheromatous vascular lesions during periods of prolonged hypotension and slowing of the circulation.

From a practical point of view parenteral fluid therapy should be discussed in two general divisions: (1) the treatment of shocklike states and (2) the maintenance of fluid, electrolyte, and nitrogen balance by parenteral means. In the older age group greater care must be used both in the selection of a fluid of proper composition and in determining the quantity as well as the route and rate of administration.

### Treatment of Shocklike States

Most clinicians are agreed that there is no infusion material better suited for the treatment of hemorrhage than whole blood. Much can also be said for the use of whole blood for the treatment of shock unassociated with massive hemorrhage. Evans and Bigger (1) have treated severely burned patients with whole blood in spite of hemoconcentration and have avoided the anemia that appears in the postshock period in many burn patients.

Even though the use of whole blood is ideal for replacement therapy in shock and hemorrhage, it is at times impracticable. Plasma, which may be stored in the liquid, frozen, or dried state, has become a popular and valuable agent in temporarily increasing the plasma volume in the course of the development of shocklike states.

Wherever plasma has a use as a means of increasing the plasma volume, there is the possibility of using one of the plasma substitutes. It should be remembered, however, that there is no substitute for the oxygen-carrying function of the red cells, and hence no true blood substitute exists. The temporary use of plasma or a colloidal plasma substitute may, by improving the circulation, aid in the better oxygenation of tissues.

Of the many substances that have been suggested as plasma substitutes, few have survived more than preliminary trial. At present only two substitutes for the oncotic function of plasma can be recommended as both safe and effective. One of these, human serum albumin, is itself a derivative of plasma, while the other, a gelatin solution especially prepared for intravenous use, is prepared from animal collagen.

Human serum albumin, which is responsible for the major colloid osmotic pressure of the plasma proteins, has the advantage of being a fraction of plasma, and hence is subject to little criticism as a substitute for it. Human serum albumin in concentrated form in small volume is of advantage only in the presence of tissue edema. The cost of human serum albumin is, of course, greater than the cost of the plasma from which it is derived, and it does not decrease the need for blood donations.

Gelatin solutions are available in several varieties, depending upon the source of the collagen used. The chief sources are hides and bone. Gelatin prepared from hides has a short-chain molecular structure and hence is excreted rapidly by the kidney. Because of its small size such gelatin can also be recovered from edema fluid in elderly patients. Gelatin prepared from bone and minimally degraded by heat is of long-chain molecular structure. Renal excretion is slower, and hence its action in the treatment or prophylaxis of shocklike states is better sustained. We have used a gelatin solution in more than 125 patients 50 years of age or more; 18 of them were over 70.

The route of infusion of any of these substances when used in the treatment of peripheral circulatory failure should, of course, be an intravenous one. The rate and amount of infusion must be judged by a knowledge of blood loss and an estimation of blood volume depletion, as well as by what is to be expected in the way of plasma volume increase from the particular substance infused.

In situations that arise in the operating room where blood loss can be estimated at least roughly, or perhaps predicted, the volume of the infusion of blood, plasma, or plasma substitute can be judged quite readily. In a patient in peripheral circulatory collapse where there has been no demonstrable blood loss, or where the extent of the blood loss is unknown, the best guide the physician has is the response to treatment. We believe that once a favorable response in blood pressure and pulse has begun, the infusion rate should be slowed.

Following the infusion of blood or plasma the blood volume is usually increased in amount approximately equal to the amount of infusion. With infusions of 6 per cent gelatin solution or concentrated human serum albumin, the maximal blood volume increase is obtained about three hours after infusion. A 500 cc. infusion of gelatin solution (6 per cent) will increase the blood volume about 750 cc., and there is about 15 cc. increase in blood volume for every gram of human serum albumin infused. Because of the delay of maximal blood volume increase, if infusions are pushed beyond immediate need the elderly patient with diminished cardiac reserve may develop pulmonary edema several hours after the infusion has been stopped.

We have come to use an infusion of one type or another during all major surgical procedures, even in elderly patients. In this manner blood and plasma losses are compensated for immediately, even if not permanently. When peripheral circulatory collapse occurs during emergency operations and blood is not available, or when the need for replacement therapy is greater than the supply of blood in readiness, we use plasma, albumin, or gelatin.

The administration of spinal anesthesia often causes a drop in blood pressure prior to or during a major operation. Even though this type of shock is known to be unrelated to blood volume change, it presents an

important problem in the aged, especially when arteriosclerosis is well established. The infusion at this time of a colloidal solution does much to relieve the apparent discrepancy between the circulating blood volume and the capacity of the vascular bed, parts of which are dilated as the result of spinal anesthesia. Figure 1 illustrates the operative course of a patient who had an immediate fall in blood pressure following spinal anesthesia and a later period of hypotension, probably due to the trauma of operation. He was treated with infusions of plasma and gelatin.

### Water, Electrolyte, and Nitrogen Balance

At any age the problems connected with the maintenance of fluid and electrolyte balance as well as adequate nitrogen and caloric intake by parenteral means are great. In the older age group, where one must keep in mind actual or potential deficiencies in cardiac or renal function, the margin of safety for intravenous infusions is decreased and management is more complicated.

As in any age group, the administration of fluids, electrolytes, and food is best accomplished by mouth. There are, however, occasions in the course of medical illness or after certain surgical procedures when other means of administration become necessary in order to maintain an efficient level of visceral function. In these instances a knowledge of some of the practical aspects of parenteral fluid therapy is valuable.

In the routine maintenance of fluid balance in patients in whom the oral route cannot be used one must rely chiefly on the intravenous and subcutaneous routes. Very little can be accomplished by proctoclysis in the average patient, and we have not found the intramedullary bone route desirable except under unusual circumstances. When the subcutaneous route is used there are limitations in the type of fluid one may give, and for that reason we use intravenous infusions in all patients except those thought to have a poor cardiac reserve. The factor of safety in intravenous infusion in the the elderly is conditioned in part by the rate of infusion. We routinely run the infusions at a uniform rate around the clock, so that even large volumes are added very slowly to the circulation.

When hypodermoclyses are used in cardiac patients or in those with poor veins, the amount that can be given is limited by chemical factors as well as by physical ones. Usually only two types of fluid are used: physiological salt solution or 2½ per cent glucose in 0.45 per cent sodium chloride solution. The latter solution permits twice the volume of fluid without increasing the intake of salt. Other solutions are too irritating to most patients, and except on rare occasions find little use.

Inasmuch as salt intake must be restricted in most elderly patients unless their serum chloride determinations indicate otherwise, our infusions usually do not exceed 1000 cc. of physiological saline solution or 2000 cc. of the 2½ per cent glucose in 0.45 per cent sodium chloride solution for

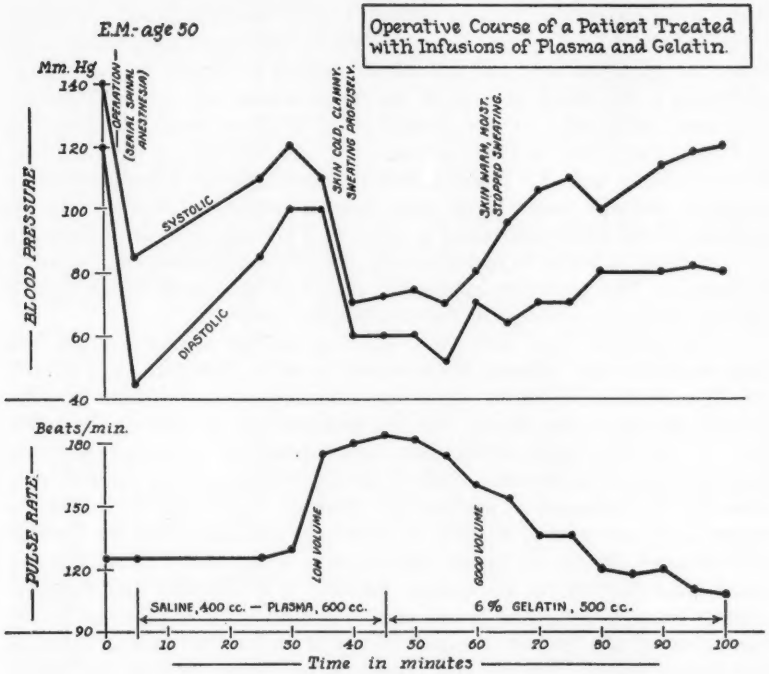


Figure 1.

each twenty-four-hour period. In many individuals hypodermoclyses of these volumes are insufficient to maintain fluid balance, and hence intravenous infusions must be used. A combination of hypodermoclyses and small, slow intravenous infusions is frequently the best method of giving 3000 cc. of fluid in twenty-four hours to an elderly patient. In such instances half may be given by each route or 2000 cc. by hypodermoclysis.

Infusions given by vein allow greater latitude in the choice of infusion materials and greater flexibility in the rate of administration. In addition to blood, plasma, or a satisfactory plasma substitute, the following solutions are routinely available: physiological saline solution, 5 and 10 per cent glucose in water, 5 per cent glucose in physiological saline solution, 2 per cent saline solution, 2 per cent ammonium chloride solution, sixth molar sodium lactate solution, and 5 and 10 per cent solutions of one of the protein hydrolysates in water.

Following the general teaching of Coller and Maddock and their associates (2, 3), we restrict salt in the early postoperative period, especially in the aged. In the usual postoperative patient only 5 per cent glucose in

water or in physiological saline solution is used for postoperative management. On the day of operation, in those who require parenteral fluids, infusions are given by vein and salt administration is limited to the amount contained in the blood, plasma, or plasma substitute and the small amount of normal saline solution used to start or to dilute an infusion. Thereafter as long as parenteral fluids are necessary we give 1.0 liter per day of a solution containing salt (8.9 grams), unless plasma chloride determinations or excessive chloride losses from other sources indicate otherwise. The remainder of the fluid requirement is given as 5 per cent glucose in water. In the elderly it is better to underestimate the salt requirement than to overestimate it. The organism apparently conserves salt much better than it excretes excessive amounts in the postoperative period.

The uses of 2 per cent saline solution, sodium lactate solution, and ammonium chloride solution are restricted to severe disturbances in electrolyte balance. If at all possible, we prefer to manage minor problems in acidosis and alkalosis in the elderly with the judicious use of normal saline solution. A 2 per cent saline solution has a very limited use in the aged, and then only in severe hypochloremia. Sodium lactate and ammonium chloride solutions for the treatment of acidosis and alkalosis respectively can be administered if the amounts to be given are carefully calculated from the formula of Hartmann (4) for the lactate and according to the rules of Zintel, Rhoads, and Ravdin (5) for the ammonium chloride. It is generally inadvisable to attempt complete correction in one step. It is much safer to give one half to two thirds of the calculated requirement and recheck the plasma chlorides and carbon dioxide. Ten per cent glucose is frequently used for its diuretic effect.

Venous thrombosis at the site of infusion and beyond is likely to occur with the administration of the hypertonic solutions, especially when the protein hydrolysates and glucose are used for the maintenance of nitrogen and nutritional equilibrium. This is another reason why the isotonic solutions are preferable, especially in those who will require parenteral fluids for long periods of time and in whom venous thromboses may constitute a serious threat to proper fluid administration.

The urinary output of the patient is the best practical guide to adequate fluid intake. Although a urinary output of 1000 cc. or more a day is desirable, the physician may have to be satisfied with a more scanty output in some of his aging patients. This is especially true if it seems likely that after a day or two of parenteral fluids the patient will be able to take sufficient amounts of water by mouth. In patients with urine of fixed specific gravity it may be necessary to obtain a larger urinary output in order to avoid azotemia.

The administration of 3000 cc. per day of fluid by vein or by a combination of the intravenous and subcutaneous routes is usually sufficient to maintain a urinary output of 1000 cc. in the patient who is losing little or

no fluid from other sources. Such a quantity, given by vein at a uniform rate for twenty-four hours, will be tolerated by most elderly patients. Occasionally there are patients who have a sufficiently diminished cardiac reserve to prohibit infusions of this magnitude, and in such patients a fluid intake inadequate to maintain this output is the lesser of two evils. In such patients care should be taken in the use of chemotherapeutic agents such as sulfadiazine, which during crystalluria may produce a renal shutdown when urinary output is seriously reduced.

The protein hydrolysates of casein or fibrin prepared for intravenous use provide a means of supplying the protein requirements temporarily by parenteral means. Although not all hydrolysates that can be purchased commercially are free from the danger of producing systemic reactions, and though infusions of most of them may result in venous thrombosis, they are a valuable adjunct to therapy. Recent quantitative studies in this laboratory have indicated that a nitrogen intake of about 0.3 gram to 0.4 gram nitrogen per kilogram per day, when given with 30 calories per kilogram per day, will in most individuals establish a nitrogen equilibrium in the postoperative period (6, 7). There is also evidence to show that the patient maintained in positive nitrogen balance recovers from major surgery more rapidly than does the patient who is not in nitrogen equilibrium (8).

We have maintained certain patients in the older age group in nitrogen equilibrium by the parenteral route alone for five or six postoperative days without producing cardiac embarrassment.

In the course of the routine management of elderly patients receiving parenteral fluids, it becomes necessary at times to give a colloidal infusion of blood, plasma, or its substitutes. By actual measurement of plasma volume increases it has been found that the edematous or well-hydrated patient experiences a greater plasma volume change after such infusions than does the normal. If a macromolecular colloidal solution is given close to the time that a substantial infusion of glucose or saline solution is given, one can expect a greater increase in the plasma volume than when the colloid is given alone. For this reason one should be especially cautious with colloidal infusions in the well-hydrated or edematous individual. Small, repeated blood or plasma infusions are safer than single large infusions. It is good practice to give such colloidal infusions during the day rather than at night, for more nurses and house officers are on hand then to recognize and treat emergencies such as pulmonary edema.

As in many phases of medical therapy, the factor of safety in administering parenteral fluids to the elderly lies in the individual assessment of the patient and in close observation of the patient's response during the course of therapy. In parenteral fluid therapy the elderly patient's margin of safety can be safeguarded by careful planning to insure that the quantities of the various substances administered are the smallest necessary and the rate at which they are given is the slowest possible.

## Conclusions

The treatment of shocklike states in elderly patients must be guided by the sound principles applicable to fluid administration in shock at any age. Attention is called to the probability of circulatory embarrassment in the aged if colloidal infusions are continued after a satisfactory response is obtained.

Parenteral fluid administration is safe in elderly patients if the individual's needs are carefully considered. The maintenance of water, electrolyte, and often nitrogen balance is possible with safety when there is proper selection of the type of fluid and of the rate and route of infusion.

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## A TWENTIETH-CENTURY CENTENARIAN

An exemplar of the great variability in aging, Henry C. Lytton, pioneer merchant and philanthropist of Chicago, will reach the century mark on July 13, 1946, still active as titular head of the store he founded in 1887. Lytton is the sole survivor of the fourteen pioneer merchants, including Marshall Field and Potter Palmer, who in the years of expansion following the Civil War changed Chicago's State Street from a dirt road to one of the world's foremost shopping centers.

Mr. Lytton says he has successfully lived a long time because he has practiced moderation in all things, though by his own report he has lived a strenuous life. He gave up smoking at about 75 and stopped drinking even light wine at about 80. He retains a good appetite and says he enjoys well-cooked foods. He is said to look, talk, and act like a man many years younger. His day begins at 8:30, with breakfast at 9:00. He reads the newspapers in bed, but does not care much for sleeping, which, he says, "wastes too much time when you get to be my age." Except in unfavorable weather he goes to his office every afternoon for three or four hours to look over the sales reports and talk with his staff.

Geriatricians will be interested in the state of Mr. Lytton's health as he approached his one hundredth birthday. According to his public relations office: "He is in good health, though he suffers from increasing deafness and has lost the sight of one eye. His mind is still very clear and he remembers many incidents that happened as long ago as seventy-five or eighty years. His general health is good, and only a bad cold in February kept him away from the office for several weeks."

# TONSILS AND AGING

George Kelemen, M.D.

IN THE well-coordinated cyclical sequence of evolution and involution of the organism the lymphatic tissue follows a remarkably independent course. According to Cowdry (2), the lymphatic system may be regarded as occupying a key position in the phenomena of aging. The tonsils, part of the lymphatic tissue, have peculiarities of structure, are much exposed to external influences, and follow a development and involutional pattern of their own. Many questions arise when one tries to gain a clear picture of the behavior and appearance of the tonsils and their role in the involution of the organism.

The pharyngeal tonsils rarely persist after puberty, but this is by no means true of the palatine tonsils.

The problem of tonsillar involutions has usually been regarded as a by-product of a general investigation of the tonsils. Although there are many reports on the presence, state, and surroundings of these organs in the aged, they are for the most part fragmentary. The lack of systematic study of this question is evident, especially where an early involution of these organs is taken for granted, despite the fact that there is sufficient evidence to show that these prominent parts of the lymphatic system persist into advanced age. Contradictory findings and data taken for granted are characteristic of the available information. The disparity between the life cycle of the tonsil and that of the organism as a whole serves to confuse the problem further.

## SOURCES OF DATA ON TONSILS

Data on tonsils may be obtained by one of three methods: (1) examination of organs from cadavers, (2) examination of operative material, and (3) clinical observation. While any one of these methods will yield data unobtainable by the other two, the results of all three should be considered to obtain an integrated picture.

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FROM the Department of Otolaryngology, Tufts College Medical School and the Long Island Hospital of the City of Boston. Aided by a grant from the Charlton Fund, Tufts College Medical School.

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The difficulties of distinguishing between normal and pathological conditions arise equally with macroscopical and microscopical observations. There is no gross feature such as size, surface color, surface differentiation, consistency, or type of adhesion to the lateral pharyngeal wall which clearly divides the normal from the pathological. In the histological picture many details originate as reactions to morbid agents, so that no normal basis for comparison is present. Moreover, except in malignancy, very large abscesses, and some other rare conditions, no biopsy findings may be taken as justification for operative measures; normal tonsillar conditions cannot be distinguished from pathological ones.

These facts are to a great extent responsible for a peculiarity in the operative indications. Though, even with rigid selection, tonsillectomy in children is one of the surgical procedures most frequently performed, in the elderly the situation is reversed. In advanced age there is resistance on the part of the patient and reluctance on the part of the physician toward the same operation, despite the fact that in later years the indication for operation is as urgent as in earlier years and technically intervention is simpler.

Whether preference should be given to operative material or to organs taken from cadavers is a question that can be answered in different ways. Material can be taken from cadavers with less injury and the block of tissues can include the adjacent structures of the tonsils. Undoubtedly it is a great advantage to examine the organ in its environment. However, the tonsil in the cadaver by no means represents the normal condition, because in the last days ante mortem fatal diseases often produce nutritional changes that cause considerable reduction in the size of the lymphatic tissue. Besides this quantitative objection, the qualitative one is of even greater importance. The disintegration of the lymphatic tissue in the cadaver is so rapid that for want of operative material some investigators were compelled to use the tonsils of animals to obtain organs fresh enough to render all the staining reactions in desired perfection. The secondary nodules decay very quickly.

Thus despite the disadvantage of the inevitable injury caused by the grasping instrument, operative material offers the possibility of immediate fixation, a circumstance of paramount importance.

### Histological Examination

In this study fifty pairs of tonsils removed by operation from individuals in the sixth decade were examined histologically. Five different staining methods gave a fairly complete picture of the different tissue components. Since these tonsils must have been uncommonly active to have necessitated an operation to liberate the organism from their influence, this operative material cannot be considered representative of the true general stage of the organ in this age group. However, the fact that every

stage of involution was seen among the specimens studied indicates that the more active tonsil is not confined to youth.

From the survey it was concluded that involution in the palatine tonsils is an atrophic process, or, more precisely, a quantitative atarophy. The cells and tissues decrease in number without degeneration and show no signs of change to a lower or functionally less active form before their final disappearance. The capsule remains well outlined even behind the last remnant of the organ, and thereby offers a plane of cleavage. Thus enucleation in old age is a comparatively simple procedure.

Septa and submucous connective tissue undergo no conspicuous hyalinization or transformation into elastic elements. There is no "senile fibrosis" in the tonsil. The final phase in the life history of the cryptal system is seen in two types, namely, with and without eversion. In those without eversion the last thing to be seen is a solitary crypt, which finally melts into the connective tissue. In those with eversion the cryptal wall becomes part of the lining of the free surface of the pharyngeal mucosa. In those without eversion the process goes on in the depth, covered by the intact surface epithelium; in those with eversion, at the surface itself. Even in this changed location the cryptal epithelium remains sharply demarcated from the original epithelium of the free surface. The crypts contain their inclusions as long as they are not transformed from deep narrow channels into open, shallow depressions.

Until its final disappearance the lymphatic parenchyma maintains the function which was the first to appear in prenatal life, that of sending lymphocytes and leukocytes through the epithelium. Scarcity of thromboses in veins and of perivascular infiltrations in the retrotonsillar space accounts for the infrequency of local reactions around the receding tonsil. At the same time, with parenchymal activity unchanged, according to the case histories, focal reactions appear at distant parts of the body, as they do at any age.

Thus in the sixth decade tonsils may be found in all stages of development, with two thirds well on their way to regression. This proportion is surprisingly low. Though many insist that the beginning of involution cannot be fixed at any definite age, it is generally accepted that it begins at an early age, and at the latest at 30. The ratio of one to two for "juvenile" tonsils is therefore certainly higher than would have been expected for this age group.

According to our material, the earliest activity of the tonsils, that of sending white blood cells through the epithelium, is the last to disappear. Thus the first and the last phases of the tonsillar life cycle demonstrate that reticulation of the epithelium is a function that can be accomplished by the cells of the lymphatic tissue of the parenchyma without their ever having been differentiated into secondary nodules. Many tonsils in the material discussed in this paper showed long stretches of completely reticu-

lated epithelium in which the transmigration was accomplished by a simple underlying block of lymphatic tissue, without crypts and without formation of secondary nodules.

TABLE I

SIZE OF THE TONSILS IN THE AGED

| Age | Number of Tonsils | Large | Medium | Small | Minimal | Empty Fossa | Considerable Diff. in the Two Sides |
|---|---|---|---|---|---|---|---|
| 61-70 | 200 | 36 | 54 | 43 | 57 | 10 | 15 |
| 71-80 | 200 | 16 | 55 | 55 | 68 | 6 | 24 |
| 81-90 | 200 | 6 | 20 | 71 | 77 | 26 | 23 |
| Over 90 | 18 | .. | 4 | 4 | 8 | 2 | 4 |
| Total | 618 | 58 | 133 | 173 | 210 | 44 | 66 |

CLINICAL OBSERVATIONS

As a following step 309 persons were examined, 300 in groups of 100 each (50 males and 50 females), with and without tonsillar complaints, in each of the seventh, eighth, and ninth decades, and 9 persons between the ages of 90 and 103. These patients were seen on the services of the Boston Dispensary and the Long Island Hospital of the City of Boston; on the wards of the Massachusetts General Hospital; in the Home for Aged Couples by courtesy of Dr. Dwight L. Siscoe; and in the Home for Aged Colored Women by courtesy of Dr. Robert W. Buck. Observations were conducted on a purely clinical basis. After obtaining a history, as complete as possible, regarding pharyngeal conditions, the records of these institutions were reviewed to ascertain the possible bearing of tonsillar changes on other parts of the organism.

With advancing age a steady decline in the size of the tonsils was noted (Table 1). The curves also demonstrated the sudden appearance in the ninth decade of a comparatively high figure for total absence of any tissue in the fossa, whereas in earlier years a completely empty fossa is rarely encountered.

TABLE 2

COLOR OF THE TONSILS IN THE AGED

| Age | Pale | Dark Red |
|---|---|---|
| 61-70 | 10 | 20 |
| 71-80 | 17 | 7 |
| 81-90 | 8 | 24 |

No characteristic color (Table 2) could be found for the different age groups. A pale color may be assumed to be the sign of a higher grade of cicatrization, and a dark red, of acute or subacute inflammation. The aspect of the surface runs the gamut of smooth, ragged, beehive, and cauliflower to flat plaques and weblike linings at the bottom of the fossa (Table 3).

TABLE 3

LOCATION OF THE TONSILS IN THE AGED

| Age | Number of Tonsils | Fossae | | |
|---|---|---|---|---|
| | | Occupied | | Empty |
| | | Completely | Partly | |
| 61–70 | 200 | 60 | 130 | 10 |
| 71–80 | 200 | 63 | 131 | 6 |
| 81–90 | 200 | 38 | 136 | 26 |
| Over 90 | 18 | 5 | 11 | 2 |
| Total | 618 | 166 | 408 | 44 |

With the first sign of eversion of the crypts their capacity to retain their normal contents decreases rapidly (Table 4). No positive cryptal finding was noted in those above 90 years of age. On the other hand, the pathological content of liquid pus appeared with astonishing frequency even at the age when dry detritus disappeared rapidly.

Clinically the last remnant most frequently seen may be either a long, narrow ridge, running parallel ot the plicae, or the "drop" form, with the ridge enlarging downward even below the lower end of the tonsillar fossa. The tonsillar fossa is untouched by the involutionary process going on within its arches (Table 5).

In these 309 patients acute tonsillitis was seen in five and peritonsillitis in three. Tonsillectomy had been performed in two patients at the age of 61 years. The longest interval since operation was sixty years. Even with local regeneration the influence of the operation was often beneficial.

TABLE 4

CONTENTS (EXPRESSION) OF THE TONSILS IN THE AGED

| Age | Scarce | Abundant | Dry Detritus | Liquid Pus | Unilateral | Bilateral |
|---|---|---|---|---|---|---|
| 61-70 | 35 | 22 | 23 | 34 | 13 | 22 |
| 71-80 | 19 | 13 | 3 | 29 | 12 | 10 |
| 81-90 | 16 | 12 | 7 | 21 | 8 | 10 |

TABLE 5

THREE TYPICAL INVOLUTIONARY FORMS OF THE TONSILS

| Age | Single Crater | Drop | Vertical Ridge |
|---|---|---|---|
| 61-70 | 5 | 18 | 18 |
| 71-80 | 5 | 12 | 21 |
| 81-90 | 2 | 11 | 24 |
| Over 90 | .. | .. | 4 |

### Comment

The role and fate of the tonsils in the aging organism differ from those of many other organs. According to Berens (1), who discusses the aging process in the eye, there seems to be little question that faulty circulation and degeneration are responsible for many of the visual disturbances of adults which are often attributed to age. Many of the so-called old age processes in the eye are caused directly or indirectly by infection. During the entire life span the tonsils cope with infection, a fact that may account for their maintaining a remarkably independent life amid the degenerative and infectious processes occurring in old age. Stieglitz (9) quotes Osler's remark: "A man is as old as his arteries," and adds: "and his vision or his imagination." But it cannot be said that man is as old as his tonsils, for they rarely reveal the age of their bearer.

The involutional process of the tonsil is as unexplained as that of any other organ. To attribute it to physiological aging or to describe it as a result of pathological processes is purely speculative. Total involution means total disappearance of tonsillar substance from the fossa, and only in the ninth decade does this condition occur with any frequency. Even necrotic tonsillitis ay be followed by total regeneration in old age. It must be concluded that the tonsil generally does not reach total involution. Certain authors have found a plateau in the curve of tonsillar involution in the period between 45 and 65. Clinically one is impressed by the fact that in the sixth decade, at the beginning of senescence or the threshold of "second childhood," there may even be a slight temporary increase of volume, corresponding to the increase generally noted in the first decade of life. Definite data regarding this important phenomenon could be obtained only by frequent observations of the same individuals of this age group, repeated over a sufficiently long period of time.

The clinical consequences of tonsillar involution should be considered according to local and general implications. The aging tonsils do not play any decisive role in the processes of their immediate surroundings, but even the smallest remnants are an important factor in producing general changes. According to Krumbhaar (7), it can be assumed that the efficient response of the tonsils to infection at any age and the fewer local infections in later life would indicate that the two involutionary periods in the fourth and seventh decades represent lessened need rather than the atrophy of old age. Perhaps the most striking sign of lessened influence in this region is the almost complete absence of the enlarged retroangular lymph nodes which are so common in younger people.

However, on rare occasions acute tonsillities occurs in advanced years. The attack may be the first one and may involve either well-developed or involuted tonsils, as well as mere vesitgal remnants or regenerates after tonsillectomy. This fact can be explained on the ground that the difference between well-developed and involuted tonsils is only a quantitative one, for

both present identical structures and every regenerate within the tonsillar fossa histologically assumes the typical tonsillar composition.

In only a few of the fifteen instances in which there had been a previous tonsillectomy was it reported that the operation had been performed in early youth. For the sake of comparison it may be noted that the tonsils had been removed in 72 per cent of 134 healthy boys between the ages of 10 and 17 seen at the Boston Dispensary in May 1942. Gallagher (3) reported that tonsillectomy had been performed in about 80 per cent of a group of 910 students of Phillips Andover Academy in Massachusetts, whose ages ranged from 13 to 19 years.

It is sometimes assumed that when tonsillectomy is performed in later years regeneration is less frequent. This assumption is not substantiated by the figures obtained in this study, since regeneration occurred after tonsillectomy had been performed in the seventh decade.

From these observations, as well as from the lack of reports of operative accidents, it can be concluded that there is no reason why the advantages of a tonsillectory should be denied to individuals of advanced age. Opponents of this view usually formulate their objections in general rather than specific items. It may be noted that in a series of over 11,000 tonsillectomies at the Mayo Clinic, reported by Wilkinson (10), there were 355 patients between the ages of 60 and 79. It is well known that today more elderly patients are ready for any justifiable operation than they were ten or fifteen years ago.

Proper evaluation of these conditions in their interrelations is impeded by the difficulty of taking a true history in old people. Besides a difficult mental approach or even outright psychoneurosis in the older person, the elucidation of a person's status becomes more and more difficult in the regressive phase of life. This difficulty extends to the tonsillar problem. Once the presence of the tonsils throughout senescence is generally recognized the role of these organs in the older age groups needs to be considered carefully.

## Summary

Histological examination was performed on fifty pairs of tonsils removed by operation in the sixth decade, and clinical observations were made on 309 persons bétween the ages of 61 and 103. A steady decline in the size of the tonsils in these years was noted, but complete disappearance was rare; in fact, it was much less frequent than the presence of large, fully developed tonsils.

Local inflammations, tonsillar and peritonsillar, are infrequent and take the same course as in any other age group. The attack may be the first one and may involve small remnants or regenertes after tonsillectomy. No greater operative risk was present in the aged than in the young.

Around the sixth decade there is a period of high tonsillar activity; regression seems to cease, and there may be a slight temporary enlarge-

ment. Thus there is a characteristic period of increased tonsillar activity at the onset of senescence, corresponding to the similar period before puberty.

Lee (8), writing of the medical care of the elderly, comments that rust, rather than wear and tear, explains the development of some conditions and diseases in the aged. Quite a few of these difficulties may be ascribed to the tonsils. With the recognition of the persistence of the tonsils even in the highest age groups, preventive geriatrics should observe these organs carefully at the threshold of the regressive years.

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## Rate of Aging Variable

Aging is a series of processes. Aging can be considered the dimension of time in living. It is an integral and inseparable part of living, beginning with conception and terminating only with death. As aging is continuous and gradual, there can be no sharp lines of demarkation. The rate of aging is variable; variation occurs between different phases of development, maturation and senescence. As a result, no one is necessarily the same physiologic age throughout. An individual's age, therefore, is the mean of the various ages of his many component structures and functional capacities.—Edward J. Stieglitz, M.D., in *New York Medicine.*

# ARE GERIATRICS MORTALITY AND MORBIDITY STATISTICS RELIABLE?

Albert Mueller-Deham, M. D.

STATISTICS are indispensable for registration and for the planning of scientific research and social action. Data on mortality and morbidity are of primary interest for medicine. The collection of such data, together with the skill of the profession, has advanced so far that the official mortality tables can in general be regarded as a true reflection of the facts. Though no one should harbor the illusion that the tables are unmarred by data based on faulty diagnoses, they may be regarded as reliable for practical purposes.

However, with respect to the morbidity and mortality statistics for the older age groups, an exception must be made to this statement of generally satisfactory data, as I propose to demonstrate.

## COMPARATIVE DATA CONSIDERED

Tables 1 and 2 embody the chief data I wish to call to your attention. Table 1 shows the official mortality figures for the higher age groups (United States, 1938). Table 2 is based on data on 200 deaths of persons over 65 years of age from the Goldwater Memorial Hospital for Chronic Diseases of the City of New York for the years 1938-40; the first three columns are based on autopsy diagnoses, the fourth column on clinical diagnoses.

A comparison of the data in these two tables shows that in Table 1, representing the official mortality figures, more than 60 per cent of deaths are ascribed to cardiovascular disease, as compared with 40 per cent in Table 2 (Goldwater Memorial Hospital). Deaths attributed to infections in Table 1 represent a small proportion, even if one adds half of those attributed to "all other causes." In Table 2, on the contrary, the percentage of deaths attributed to infectious diseases is as great as that for cardiovascular disease. Thus there is a gross discrepancy between the two sets of figures. Nevertheless, I believe it can be maintained that the figures representing the smaller number of cases more accurately picture the true situation.

It would be an obvious and justifiable reaction should the reader protest that one cannot compare data based on 200 cases with those of the United

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TABLE 1

OFFICIAL MORTALITY TABLE FOR HIGHER AGE GROUPS

*(Per cent distribution of deaths from specified diseases or conditions. United States, 1938.)*

| Disease or Condition | Age Group 60-69 | 70-79 | 80-89 | 90-99 |
|---|---|---|---|---|
| WHITE MALES | | | | |
| All causes | 100.0 | 100.0 | 100.0 | 100.0 |
| Cardiovascular-renal diseases | 54.4 | 61.8 | 66.4 | 63.1 |
| Cancer | 14.4 | 13.1 | 8.6 | 4.9 |
| Accidents | 5.0 | 3.8 | 4.3 | 5.7 |
| Influenza and pneumonia | 5.1 | 5.3 | 6.6 | 8.6 |
| Tuberculosis | 2.9 | 1.2 | .4 | .3 |
| Diabetes | 2.5 | 2.4 | 1.3 | .6 |
| All other causes | 15.7 | 12.4 | 12.4 | 16.8 |
| WHITE FEMALES | | | | |
| All causes | 100.0 | 100.0 | 100.0 | 100.0 |
| Cardiovascular-renal diseases | 51.4 | 61.9 | 66.1 | 62.8 |
| Cancer | 19.4 | 13.5 | 8.3 | 4.7 |
| Accidents | 3.1 | 4.3 | 6.7 | 8.4 |
| Influenza and pneumonia | 5.2 | 5.6 | 7.0 | 8.5 |
| Tuberculosis | 1.9 | 1.1 | .4 | .2 |
| Diabetes | 6.3 | 4.3 | 1.8 | .6 |
| All other causes | 12.7 | 9.3 | 9.7 | 14.8 |

TABLE 2

MORTALITY TABLE OF 200 AUTOPSIED CASES OVER 65 YEARS OF AGE

(Goldwater Memorial Hospital)

| | Autopsy Diagnoses (Per Cent) | | | Clinical Diagnoses (Per Cent) |
|---|---|---|---|---|
| | Group I | Group II | Total | |
| Cardiovascular disease | 26 | 14 | 40 | 57 |
| Includes: hypertensive and arteriosclerotic cardiovascular disease | 22 | 11 | 33 | 48 |
| Cerebral accidents | 2 | 2.25 | 4.25 | 8 |
| Rheumatic heart disease | 2 | 0.75 | 2.75 | 1 |
| Infections group | 20.5 | 19.25 | 40.75 | 26.5 |
| Includes: Pneumonia | 8.5 | 12.5 | 21 | 16.5 |
| Urinary infections | 6.5 | 3.25 | 9.75 | 4.5 |
| Other infections | 4.5 | 4.5 | 9 | 5.5 |
| Neoplasms | 11 | 1.25 | 12.25 | 7.5 |
| Miscellaneous diseases | 5.5 | 2.5 | 7 | 9 |
| Total cases | 63 | 37 | 100 | 100 |

States Public Health Service, based on figures from the entire country. However, two counter arguments may be presented.

First, examination of Table 2, column 4, based on clinical diagnoses and not on autopsies, shows 57 per cent of deaths attributed to cardiovascular disease, as compared to the official figure of more than 60. Moreover, except for the larger percentage of deaths attributed to pneumonia in the hospital data, these clinical diagnosis figures are almost completely in accord with the official data.

Again, statistics on mortality at advanced ages from two published studies, representing data from institutes of pathology (1, 2), show a death rate from circulatory affections not exceeding 41 per cent (that is, respectively 40.4 and 37 per cent). The first of these studies, by L. Aschoff,

represented 400 cases over 65 years of age and the other related to persons over 70.

These results would seem to justify the interpretation that essentially one is dealing here with differences attributable, not to large and small numbers of cases of basic material, but rather to a disparity between anatomical and clinical diagnoses.

### Multiple Diseases Characteristic of the Pathology of Senescence

In the pathology of senescence a multiplicity of diseases is a paramount characteristic. Even after necropsy it is not always possible to attribute death to a single or predominant cause; rather, there are often several factors that appear to be of equal importance. These facts find expression in Table 2. In column 1 are grouped cases in which death could be attributed primarily to a single disease, though even so there were usually important contributory causes. In column 2 are grouped cases in which at least two factors contributed to such a degree that it was quite arbitrary to consider either of them the primary cause of death.

An example will serve to show the method by which such problems were treated statistically. Given a group of thirty persons, of whom ten succumbed to heart disease, ten to pneumonia, and ten to a combination of the two diseases, with the autopsy and clinical records offering no basis for naming either disease as the primary cause of death, it would represent no essential distortion of the facts to assume that the two diseases were equally responsible for the death of the last third. Then each disease may be regarded as causing the death of half the group, and one may state that half of the thirty died of heart disease, half of pneumonia. This mode of expression does not reproduce the facts exactly, but does adequately represent the relative causation, and the influence of combined diseases on mortality finds its mathematical expression. The second column in Table 2 is based on an application of this principle to all analogous problems.

### Defects of Present Mortality Statistics

An essential defect of all present clinical mortality statistics is their neglect of combined diseases and multiple causes of death. It is true, the physician has an opportunity to add contributory causes of death to the one he designates as the principal cause. However, only the one he lists as the principal cause finds its way into the statistical evidence, and the other data are lost. This omission is not so important in the younger age groups, but it weighs heavily in advanced age.

Moreover, whether, when the two differ, a basic severe pre-existent disease or the immediate cause of death takes precedence in the death certificate is not clearly expressed in theory, and no consistent policy is followed in practice.

For example, consider the case of a patient who has been treated for a

long time for an advanced heart disease, but whose death is brought about in the end by a pneumonia which can by no means be called terminal. In such an instance it is psychologically sound, and cannot be called medically incorrect, to designate heart disease as the principal cause of death, though pneumonia was the immediate cause.

Evidently it is the prevailing custom of doctors to stress cardiovascular disease as the cause of death in dubious cases, for otherwise the percentage of deaths attributed to influenza and pneumonia in the official mortality table (5.1 to 5.3 per cent between 60 and 79, 8.3 per cent over 90) would not be so low.

On the other hand, bronchopneumonia, if it occurs postoperatively, is usually registered as the cause of death in surgical wards. Surgeons prefer to let their patients die of complications—an understandable preference.

Another instance of factors leading to distortion of mortality statistics may be cited. Diabetes mellitus has come more to the front as a frequent cause of death in old age. However, few of the aged succumb to the disease itself, that is, in coma or from extreme emaciation. Rather, they die from its complications, which can be entered under cardiovascular disease or infections.

All these technicalities of registration play an important role in the distortion of mortality statistics for the aged. However, the errors proceeding from this cause are small as compared to those arising from diagnostic errors.

All authors who have concentrated on geriatrics are unanimous in their opinion that diagnosis in the aged is much more difficult and uncertain than in any other life period. The causes can be stated in a single sentence (1): "They were found in an absence or essential diminution of many signs and symptoms, in changed physiological and pathological standards, and in the multiplicity of various simultaneous affections, all of which enforce a different method of diagnostic reasoning."

The obstacles to correct diagnosis in the aged will not be further discussed in this paper, the remainder of which I propose to devote to the consequences of these diagnostic failings.

## Comparison of Clinical and Autopsy Diagnoses

The material of the Goldwater Memorial Hospital is unlikely to be influenced by either the shortcomings or excellence of individual physicians, for the hospital consists of three independent services, of which two are conducted by universities. The autopsy and clinical records under perusal were derived from all three units — medical, surgical, and neurological. Deterioration of the services through a shortage of doctors and nurses began only after the period studied. It can safely be maintained, therefore, that geriatric diagnosis at the hospital represents at least a fair average. The possibility that better results are achieved in exceptional institutions is amply

counterbalanced by a lower standard in the numerous smaller hospitals throughout the country which have less elaborate facilities and staff work.

One example of correct clinical diagnosis of cause of death at the hospital, and one of inadequate clinical diagnosis, as proved by autopsy, will suffice to show the kind of data on which Table 2 is based.

EXAMPLE I. CORRECT CLINICAL DIAGNOSIS

| Initials, Registration Number, Age, & Sex | Clinical Diagnosis | Autopsy: Immediate Cause of Death | Contributory Causes | Pathological Data of Clinical Significance | Pathological Data without Clinical Significance |
|---|---|---|---|---|---|
| 70) J.K. 3415 84, f. | Cerebral hemorrhage (left hemiplegia). Bronchopneumonia. General arteriosclerosis. Arteriosclerotic heart disease. Kyphosis. | Cerebral hemorrhage right (middle cerebral artery). | Confluent lobular pneumonia. Multiple thrombi of pulmonary artery. Sclerosis of coronary and myocardial vessels. | Arteriosclerosis of aorta and kidney. | Benign papilloma of colon. |

EXAMPLE II. INADEQUATE CLINICAL DIAGNOSIS

| | | | | | |
|---|---|---|---|---|---|
| 144) S.F. 1488 65, f. | Hypertensive and arteriosclerotic heart disease. Arteriosclerotic gangrene (foot). Diabetes mellitus. | Chronic pyelonephritis and purulent cystitis. | Pulmonary edema and congestion. Congestion of liver. | Ulcers of feet and osteomyelitis (metatarsus and phalanx). | Calcification of mitral ring. Arteriosclerosis of kidney. Fibromyoma of uterus (calcification and degeneration). |

In Example I the diagnosis is essentially correct, though not entirely complete. Completeness is a rare exception in geriatric diagnosis. The differentiation of pulmonary thrombosis from a concomitant pneumonia cannot be expected. The papilloma of the colon played no clinical role.

In Example II the vital and ascertainable fact of the severe affection of the urinary tract was missed.

In compiling Table 2 the clinical diagnoses were classified by taking into account only the causes of death, disregarding any discrepancies in non-vital findings, and without consideration of whether a cause of death was thought to be principal or contributory, provided it was mentioned in the final clinical statement.

On this basis 46 per cent of the diagnoses proved correct, as shown by autopsy findings, and 54 per cent were not satisfactory. Of the latter group 20 per cent were wrong, 14.5 per cent incomplete (one of the causes of death was missing), 5 per cent contained unconfirmed statements, 15.5 per

cent had erroneous interpretations, and 1.5 per cent had a combination of these faults.

This result is quite below the standards that can be reached with younger age groups in a well-conducted institution, and are reached with them in the same hospital, as was shown by a perusal of the records of younger persons.

However, there is an extenuating circumstance. As in almost all hospitals, autopsies could be performed on only a minority of the patients. It is understandable that the staff makes a more vigorous effort to obtain the consent of the family to a post mortem in difficult and dubious cases. It is entirely possible, and even probable, that the correspondence between clinical and anatomical data would have been closer if all who died could have been dissected.

This consideration is a consoling one for physicians, but for our problem it is of little avail. What one really wants to know is the general standard of geriatric diagnosis in the United States. There is no doubt that hospital diagnosis greatly excels in quality that of general practice, owing to the co-operation of the staff and the greater use of laboratory facilities. Most old people die in their homes, under the care of general practitioners. It can be safely assumed that the deterioration of hospital figures owing to a one-sided selection of the more obscure cases for necropsies is amply balanced by the superiority of hospital diagnoses, and that our figures are usable and indicative for general conclusions.

## The Validity of Morbidity Data in Old Age

What has been said of mortality is valid to an even greater extent for morbidity in old age, even if one excludes all the accidental findings of silent disease which played no role in the clinical picture. But the role of silent disease may also be important. Without showing any of the common signs and symptoms, persons of advanced years may die of a purulent cholecystitis, appendicitis, or a coronary thrombosis. They may even succumb to a severe enteritis before a single diarrheic stool has left the rectum. In such cases no diagnosis can be made. In other cases the clinical phenomena are so insignificant that only a physician thoroughly experienced in geriatrics becomes suspicious. But such a suspicion may save a life.

In this paper I do not intend to offer a full discussion of the morbidity figures in the material quoted, for they have been extensively reported and commented on elsewhere (1). Only a number of characteristic examples will be mentioned.

Pulmonary emphysema, though rarely mentioned, is nevertheless an important incapacitating factor. So also are chronic bronchitis and bronchiectasis. There is a tendency to recognize only acute and congestive bronchitis. Acute pleurisy and even massive pleural adhesions are often overlooked. The differential diagnosis between inflammatory and transudative effusion

is frequently missed, either through reliance on a negative X-ray picture or omitting to perform an exploratory puncture—an omission which also obscures the frequent and insidious change from a serous exudate to an empyema. It is of less importance when pulmonary edema and terminal pneumonias are insufficiently recorded in the clinical statements, because they are so often only a sign of impending death.

It is universally known how insignificant the symptoms of pulmonary tuberculosis can be in the aged. However, they are ascertainable if X-ray and sputum examinations are properly utilized. Still more serious obstacles are met in the recognition of the hematogenous forms of tuberculosis characteristic of senility: miliary spread and affections of the bones, lymph nodes, meninges, genitalia, and intestines. The diagnosis is often difficult or even impossible. Moreover, the attention of the profession is not focused on these types of tuberculosis.

In the circulatory system rheumatic heart disease, endocarditis, and pericarditis fall short of recognition, whereas acute coronary thrombosis is too frequently assumed, particularly in sudden death.

The differentiation between encephalomalacia and brain hemorrhages is quite unreliable, and a cerebral accident is at times asserted where only edema can be found. The diagnosis of brain tumors meets with unusual difficulties in old age. Many other neoplasms also evade detection. The signs are often missing, slight, or misleading. The statistical decline of cancer in the higher age groups (Table 1) is only an expression of diagnostic insufficiency.

Usually ulcerations of the stomach, including very extensive forms, and of the duodenum run a silent course and are revealed only by the occurrence of a hemorrhage or by a routine gastrointestinal X-ray examination. The same statement applies to polyposis, diverticulosis, and even to a considerable proportion of cancers. It has already been pointed out how difficult the diagnosis of gallbladder and appendix disease may be. Most of the peritoneal complications starting from these or other affections offer a quite different clinical picture from that in younger persons, and they are therefore less understood and at times quite obscure.

It is a sign of simple neglect and underestimation if cystitis is usually not mentioned in the diagnosis, in spite of the finding of white and red blood cells in the urine. In our material cystitis is registered forty-nine times in the anatomical reports and only nineteen times in the clinical reports. But in the cases where it was not mentioned the affection was in ten cases of major, even vital, importance. One must not forget that a severe hemorrhagic, ulcerative, or necrotizing bladder inflammation alone can kill a senescent patient in a few days, and that it is often connected with pyelonephritis. Pyelonephritis was found thirty-seven times in necropsy, but was clinically recognized in only a few cases. In ten cases in which the diagnosis was missed it was of vital importance as the chief cause of death, or as one

of the causes. Ten per cent of our patients died of urinary disease; in only half was this condition stated in the clinical diagnosis.

I believe that this enumeration of facts, which could be continued, gives sufficient evidence that clinical diagnosis does not offer a substantial basis for reliable mortality and morbidity figures in old age. No statistics can be better than the basic material, whatever the size of the sample.

In studying old age the statistical method offers adequate results only in those diseases and signs that can be easily recognized and measured. Such instances are diabetes mellitus, hypertension, heart size (as determined by X-ray), electrocardiographic and laboratory findings, and arthritic and rheumatic complaints.

## Conclusions

Coming now to some general conclusions: (1) Present official mortality and morbidity statistics for old age are inadequate for scientific and practical purposes. (2) In old age statistics, death from cardiovascular disease is overestimated and death from infections is underestimated. (3) At present autopsies offer the only reliable basis for mortality and morbidity data in old age.

Each of these statements leads immediately to implications of practical importance.

The difficulties of geriatric diagnosis are partly intrinsic and insurmountable. No one can hope to reach the same precision for old persons as for younger age groups. But many shortcomings are avoidable by careful observation of aged persons, when all modern facilities, special experience, and knowledge of geriatrics are used. This fact should be taught and stressed in medical and postgraduate education.

A further improvement would result if, in compiling the morbidity and mortality statistics of old age, cognizance were taken of the primary facts of multiple disease and combined causes of death in senescence.

For prolongation of life and sparing of misery in old age the fight against infections is at least equal in importance to the prevention and therapy of arteriosclerosis, hypertension, and cancer. Early recognition and treatment of even slight infections promise immediate results, for potent means are in the hands of the profession.

It cannot be denied that there is an important objection to statistics based solely on post-mortem examinations. How far is hospital material representative of general morbidity and mortality, which are the real issue? Admittance to a hospital is a selective process, and the use of such material may distort the normal data on death and disease. The only ideal substratum would be a geographical unit of both urban and rural population, rated as relatively stable, where every case of death above the age of 60 years was automatically brought to autopsy. The formulation of this idea immediately demonstrates the impossibility of its fulfillment. There is no way out:

necropsies are performed only in hospitals. Such material may not be perfect, but much can be learned from it, as even our small number of cases shows.

Nevertheless, these data are doubtless too few for final conclusions; they are only indicative, not conclusive. An extension on a broad basis is necessary.

### A Proposal for the Collection of Data on Morbidity and Mortality in Old Age

Would it not be a worth-while undertaking for the American Geriatrics Society or some other scientific group or institution to organize the collection of data on post-mortem examinations of old persons?

In order to obtain the best results certain conditions must be met: (1) The material must include as many cases as possible, not only from large and prominent institutions but also from small hospitals in every part of the country. (2) In preparing mortality statistics the responsible clinicians and pathologists should work co-operatively, considering all contributing factors. (3) The reports must include both anatomical and clinical findings (diabetes and hypertension, for example, are diagnosed clinically); the findings must further be classified into data of clinical relevance and additional findings.

### Summary

Medical progress has been so spectacular in recent decades that the profession can calmly face the fact of some shortcomings in geriatric practice. It will lose no time in correcting them as speedily as possible if it sees the need.

Morbidity and mortality statistics are unsatisfactory for the higher age groups.

Deaths from cardiovascular disease are overestimated; those due to infections are underestimated.

Reliable data can be based only on autopsy findings.

A proposal for collecting such data on a broad basis is made.

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### Discussion by Malford W. Thewlis, M.D.

Those who have read Dr. Mueller-Deham's excellent book *Internal Medicine in Old Age* know the soundness of his teachings. I am in agreement with his idea that morbidity and mortality statistics are unsatisfactory in the older age groups and also that reliable data can be based only on post-mortem findings. No doubt deaths from cardiovascular disease have been overestimated and those from infections underestimated.

Most of our present statistics are based on government figures; these, of course, are in turn based on death certificates. How are these figures ob-

tained? Relatively few of them are a result of post-mortem examinations in hospitals; the others are slipshod diagnoses made by the practitioner, who jots down anything he can think of to cover up a diagnosis he failed to make. It is too easy to write down cardiovascular disease, cerebral hemorrhage, or uremia. Moreover, even if the principal cause of death were ascertained correctly, the chances are that contributory factors are not discovered except when post-mortem studies are made. Multiple causes of death are the rule in old age.

Some post-mortem studies are made by physicians or surgeons who are not especially expert in old age problems. Often the brain is not examined, though it is one of the most important organs to be investigated. Another point is that these examinations can be made in private practice if the physician concentrates on the problem. There are some physicians in rural areas whose necropsy records compare favorably with those of hospitals.

Dr. Mueller-Deham's work has stimulated me to attempt to correct some of the common errors in diagnosis. For example, I have listed the diseases he has commonly found at necropsy in older persons and have attempted to discover these by antemortem examinations.

Dr. Mueller-Deham has found that chronic pyelonephritis and purulent cystitis are overlooked. Is there any excuse for this oversight if a physician is on the alert? There is no reason why cystoscopic studies should not be made almost as routinely as a throat examination. Ulcers of the stomach and duodenum can be brought to light by careful X-ray studies. Pulmonary emphysema, chronic bronchitis, pleurisy, pulmonary tuberculosis, rheumatic heart disease, endocarditis, pericarditis, brain tumors, and many other diseases could be detected if a physician took a good history and had adequate X-ray and laboratory studies made. If these measures were taken more older persons would be spared lingering and painful illnesses and the pathologist would have less chance of picking up our errors than he has now.

As the matter stands, the pathologist has the last word to say about the cause of death. Perhaps it is right that he should have. However, ideally the clinician, armed with adequate records and examinations, should ask the pathologist to verify his clinical findings. The pathologist can only state what he finds; in many instances it is almost impossible for him to correlate his findings. How can he tell whether pneumonia or pyelonephritis was the primary cause of death? It is all a complicated process.

With Dr. Mueller-Deham, I would plead for better diagnoses and more post-mortem studies. I believe that the American Geriatrics Society should help to organize the collection of data on post-mortem examinations of the aged, just as it should help medical colleges to arrange the curricula of geriatrics teaching.

Relaxation and versatility, it seems to me, go best with a strong and noble mind, and do it singular honor. There is nothing more notable in Socrates than that he found time, when he was an old man, to learn music and dancing, and thought it time well spent.—MICHEL DE MONTAIGNE.

# REPORTED EFFECTS OF ANTIRETICULO-CYTOTOXIC SERUM DEVELOPED IN RUSSIA

Stephen J. McDonough

WITH neither enthusiasm nor deprecation American medical men are proceeding with characteristic thoroughness in their study of the effects of the antireticulo-cytotoxic serum developed in Russia. This serum has been somewhat loosely hailed as a biological that will prolong life and cure cancer.

Because of the intense interest expressed by many physicians concerned with problems of the aged, *Geriatrics* goes back to the original reports of the Russian investigators and combines them with more recent observations of physicians in this country, in an attempt to assay the present knowledge of the serum.

Dr. Harry Goldblatt of Western Reserve University, who has made ACS from fresh human corpses following accidental death and provided it for widespread use because of the demand, reports that it has alleviated the pain of some types of cancer when morphine and other analgesics were no longer effective. Some evidence has been offered from other laboratories that it will, as Dr. Alexander A. Bogomolets, the Russian discoverer, claims, slow down the spread of metastases in some forms of cancer following excision or other treatment of the primary growth.

There is no evidence at hand among the American investigators that the serum has any appreciable effect in lengthening the life span, nor does the little Russian literature that has reached the United States offer any reason to believe that it has such an effect. Bogolomets merely expresses in his early report the hope that it will eventually do so. It is possible that the Russian scientists have in this field, as in so many others, failed to report more than a part of their findings to the world. The publications of the Kiev Institute of Pathology at Ufa in the Ukraine, headed by Bogolomets, have provoked a revival of the perennial questions: "What is old age?" and "Why does man die?" Perhaps we are no nearer the answers than before, but the fact that man is still seeking the answers offers ground for some hope.

The genesis of the present work goes back almost fifty years to the

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work of Jules Bordet at the Pasteur Institute of Paris. As a pupil of Metchnikoff, the famous Russian physiologist, Bordet found that if leukocytes, liver, or kidney cells are injected into an animal of a different species the blood serum of the animal becomes toxic to the cells that have been introduced and will kill these cells if reinjected into the animal from which the original cells were taken. This discovery of cytotoxicosis was followed up by Bogolomets, who refined the technique and went on to show that minute amounts of the serum strengthened specific elements of tissues, instead of killing or dissolving them.

The serum used in his studies on man is prepared by immunizing horses with cells of the spleen and bone marrow of a human corpse soon after death, preferably accidental death with no infectious disease present. The amount of cytotoxins present in the serum of the immunized animal is determined by a modification of the complement-fixation test, a dilution of 1:100 being normally sufficient to give a complete fixation of the complement. The serum is administered subcutaneously in doses of 0.03 to 0.10 cc. of the 1:100 titer, diluted ten times with isotonic saline solution.

Bogolomets renewed the work of his predecessors after an intensive study of people in Abkhasia, a section of Russia in the Caucasian Mountains, revealed the existence of almost 30,000 men and women who had passed 100 years of age and 35 ranging in age from 113 to 136, with one youngster of 107 contemplating a new marriage venture. Such longevity compares with an average life span of 35 to 40 in India and 65 in the United States. At 70 these people were considered in full vigor, and frequently after passing 100 they seemed to acquire a "second wind." This phenomenon has been noted also by Grace E. Bird of the Rhode Island State College of Education, who in 1943 reported observations on 450 centenarians in the United States. These aged persons had recovered some degree of failing eyesight, regained some of their hair coloring, and were unusually resistant to strain, disease, and injury.

Simms, physiologist of the College of Physicians and Surgeons, Columbia University, after a ten-year study of the problems of aging believes that 90 per cent of all deaths in the United States each year result principally from the progressive loss of resistance to disease with advancing age. It is his opinion that further knowledge of the chemical mechanism by which resistance is maintained may so retard the aging process that death would occur only from accidents or infections severe enough to kill the healthiest child.

It has also been pointed out that men and horses reach their maximum physical development at about the same relative age—25 years in man and five years in the equine species, yet the horse maintains vigor four times as long as is required to reach full physiological development, while man approaches senescence in about half the relative time, instead of living to be between 100 and 150 years of age.

The difference, Bogolomets believes, is not a matter of time *per se* but of changes in the connective tissue of the body. In his centenarian subjects the connective tissue was healthy and actively functioning. In the cells of this tissue, he contends, occur the fundamental exchanges involved in cell building and cell scavenging, and if this "hemato-parenchymal barrier" becomes clogged up both processes slow down and ultimately stop, with death inevitably following. However, if this tissue remains alive and vigorous, as he found it in the centenarians studied, the body will continue to function normally far past the traditional three score years and ten.

How to keep this reticulo-endothelial filter clean and functioning was the problem Bogolomets studied with the aid of sixty students at the Kiev Institute of Pathology until the German army invaded Russia in 1941. Then all attention turned to military medicine, and supplies of the anti-reticulo-cytotoxic serum were diverted to the treatment of wounded soldiers. The Russian reports claim considerable success in the treatment of typhus and many other infectious diseases and in speeding the healing of fractures. Its effectiveness in the treatment of fractures has been confirmed by Reuben Strauss of Los Angeles in experiments with rabbits.

Bogolomets has not advanced ACS as a cure for cancer. He reported in 1942 that administration of the serum following surgery for stomach and mammary cancer greatly reduced the number of relapses, and apparently restored the capacity of the blood to dissolve cancer cells. This cancerolytic capacity is very low or absent in the blood of patients in advanced stages of cancer. However, Bogolomets is convinced that a systematic broad practical application of this method of prophylaxis of cancer relapses by stimulating the physiological system of the connective tissue with the antireticulo-cytotoxic serum can save annually many thousands of years of human life. The dissolution of cancerous cells seems to result from the action of a complex of proteolytic, and probably also of lipoidolytic, ferments produced by the cells of the physiological system of the connective tissue, probably by its histiocytes.

According to Bogolomets the serum has but one therapeutic effect: when injected subcutaneously in doses averaging from 0.03 to 0.10 cc. in 10 cc. of sterile saline it acts as a stimulant to the physiological system of the connective tissue. Larger doses, however, exert an inhibitory or blocking effect, with harmful instead of beneficial results. The difference in the activity and effectiveness of ACS as compared with other sera is that, unlike diphtheria antitoxin or tetanus antitoxin, for example, which are specific against invading organisms, ACS produces a general stimulation of the body's defenses against all invading organisms. Thus there is no direct action against microorganisms, Rickettsiae, or viruses, but instead an overall stimulation of resistance and disease-fighting ability of the physiological system of the connective tissue of the body. "The purpose of antitoxic and bactericidal serums is to create passive immunity. The antireticular-cytotoxic

serum is administered in cases of infectious disease with the aim of intensifying the formation of active immunity. The application of the antireticular-cytotoxic serum is recommended in all cases when it is necessary to strengthen the plastic, trophic, and protective functions of the physiological system of the connective tissue, irrespective of the causes which affect these functions."

Among the diseases reported by Bogolomets and others to have responded favorably to such treatment are scarlet fever, some staphylococcal and streptococcal surgical infections, puerperal fever, acute rheumatism, lung abscesses, osteomyelitis of the jaw, and some cases of simple schizophrenia.

The stimulating action of the serum was observed during the first few hours and days after the original injection, with an increase in the permeability of the hemato-parenchymal barrier, dilatation of the capillaries, and an increase in lymphocytosis readily apparent. The lymphocytosis disappears within three or four hours following injection, and is followed by a relative monocytosis lasting several days. The monocytes disappear fairly rapidly into the blood stream and thence into the tissues, with an affinity for the parts of the organism in greatest need of the protective and plastic functions they perform, in many instances parts where inflammation is present.

In our advance toward improving human health and increasing longevity therapeutic measures intended to destroy the causes of disease within the body and provide symptomatic relief are no longer sufficient, Bogolomets believes. The greatest advances, he holds, may be expected by working with nature, as the physician has always done, in improving the condition of the connective tissue, the health of which governs the health of the entire body.

*Modern Medicine Publications records with regret the death of Stephen J. McDonough at Rochester, Minnesota, June* 29, 1946.

# THE ARMY OF THE AGED: A SOCIOMEDICAL PROBLEM

Belle Boone Beard, PH. D.

THE medical profession is confronted with a new problem. Society has dumped in the laps of the doctors ten million new patients, with the promise that the number will increase to twenty-five or thirty million within the next few decades. These new patients, or potential patients, are the army of the aged. They are in reality a new increment in society.

The aged present new medical and social problems, first, because of their increasing number; second, because of their status in society; and third, because of their particular psychological reactions. The physical and social causes of the problems are inseparable; therefore the solution must be a sociomedical one. The purpose of this paper is to show why the aged present new problems and why the solution is a joint task for medicine and social work.

## NEW DEMANDS FOR MEDICAL CARE

Largely owing to medical advancement, the proportion of older persons in the population has increased so rapidly that we are beginning to speak of this as the century of centenarians. Never before in the history of mankind has any nation had so large a percentage of old people in its population as the United States now has (1). In some areas of Florida and California every fifth person is over 65 years of age.

In 1800 men, women, and children in the United States numbered somewhat less than ten million. They were largely active pioneer people. Caring for the health of the nation were about five thousand physicians, or one physician for every two thousand persons. Today the aged alone—those 65 years of age or over—virtually equal the total population of the United States in 1800. The majority of these aged people need now, or will need within a few years, specialized medical care. Do we have a sufficient number of geriatricians to care for these people? Are we prepared to give these aged millions even as much care proportionately as the population received in 1800?

Thus while medicine has solved one set of problems by keeping people alive longer, it has created for itself a set of new and different problems.

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The mere presence in society of such a high proportion of aged people, all of whom are potential patients, means that every practitioner will meet in his practice new diseases characteristic of older people and new manifestations of old diseases. Moreover, the differences in physical and mental reaction will demand new types of medication and new methods of approach.

The first problem, then, is the need for new methods of giving adequate, specialized medical attention to the increased numbers of aged persons.

### No Place for the Aged

In the second place, the aged form a new societal increment in that they have no institutionalized place in society. In all earlier eras the aged have formed an integral part of the family organization and have played a significant role in economic, political, and religious organizations. Today the aged are "ex-family"; when one speaks of the present-day family one means a man and a woman with minor children living together in a household. Every year more older people live apart from families, often alone.

Youth and middle age expect older people to "live their own lives." The adoption of compulsory retirement plans by industry and the professions has almost eliminated paid employment for persons over 65 years of age. The processes of industrialization and the mechanization of agriculture have reduced the opportunities for older persons on the land. Decrease in home production of canning, preserving, baking, laundry, sewing, and knitting have left few tasks which older people may do in the home to earn their board and keep. Many hotels and boardinghouses refuse to take retired people. Even political, social, and civic organizations have established the policy, explicit or implicit, of restricting office holding to younger members. A bill was recently introduced in a state legislature barring citizens from holding office after the age of 70. The main business of some churches has now been delegated to "the Younger Elders."

### The Psychological Problem of the Aged

The third aspect of the problem of the aged lies in the nature of their social and psychological reactions. Society has forced artificial attitudes upon older people. By denying the aged any place with recognized status, society has forced older people into denying the existence of age. One concrete evidence of the pressure is the fact that more than half a million more people applied for old age assistance under the Social Security Act than were estimated to be eligible on the basis of previous age statements (2). At first this fact was interpreted as indicating that people were trying to deceive the government and exaggerate their ages in order to receive assistance. But when documentary proof was obtained it was discovered that their age claims were accurate and that the deception regarding age had occurred earlier. Probably aging persons were motivated by the fear of losing their jobs if their true age were known, or perhaps they misrepresented their age

merely because public attitudes favored younger people. The desire to ignore symptoms of aging leads to the neglect of minor physical ailments and sometimes to the postponement of needed medical care.

The tendency of young and middle-aged people to consider the aged as "living in another world" is likewise pernicious. Such expressions as "they have had their day," "they have lived their life," "they have done their share of the world's work," "they should no longer be burdened by responsibilities," suggest the desire of younger people to remove older ones from active competition—in short, to isolate them from society.

We really seem to be moving toward an impasse. The aged are increasing in number and their necessity for social participation is consequently expanding; yet the place of older persons is being restricted. Just as society is discovering that if aged people are not to be insuperable burdens they must be kept active participants of society, that same society is developing new ways of rejecting them.

### Medicine and the Aged

Medicine has been more alert to the increasing needs of the aged than has any other social profession. The year 1946 saw the birth of two specialized medical journals, Geriatrics and The Journal of Gerontology. The mounting literature on psychosomatic medicine shows the awareness of medicine of the relationship between physical and social factors. In no field is this relationship more apparent than in the field of geriatrics. In spite of this fact little attention has been given by medical associations and practitioners in general to the sociomedical aspects of the problem.

An objective observer cannot but wonder whether present attitudes toward the aged have not retarded the progress of geriatrics. It seems strange that medical science should wait until there are ten million aged people to show its awareness of the need through the simultaneous appearance of two professional journals on geriatrics. Although there are twenty-five or thirty national organizations devoted to child welfare, there are to date no national social welfare organizations devoted exclusively to the problems of the aged.

The specialization of pediatrics gave impetus to the scientific study of child welfare. Today the medical profession is challenged to develop a specialization of geriatrics sufficiently broad to help solve the ever increasing problems of the welfare of the aged. The solution may lie in new forms of coordination in which geriatricians, geriatric nurses, and geriatric social workers will form units for the co-operative study and treatment of older patients. Such research studies as *Patients Have Families* may suggest techniques for analyzing the relationship between medical and social problems and for developing coordinated treatment programs (3).

### Sociology and the Aged

Sociologists are just awakening to the urgency of the problems of the

aged (4). As a result a radical change is now taking place in sociological literature. Whereas a few years ago the authors of college textbooks for courses in "The Family" omitted all reference to the aged, they are now beginning to devote chapters to this subject. Many investigations are now in progress to determine the exact scientific nature of the problems and possible remedial programs (5). In this connection the new field of geriatric social work is just beginning to emerge (6). Typical examples of this new specialization are The Benjamin Rose Foundation in Cleveland, which has developed new techniques of case work for the care of the aged (7), The Home for Aged and Infirm Hebrews in New York City, which has pioneered in new schemes for apartment and co-operative living for older people (8), and The Child Welfare and Community Health Association of New Orleans, which has developed a home nursing care program for people over 50 years of age (9).

### A Joint Task for Medicine and Social Welfare Agencies

Planning to meet the medical needs of the aged is a joint responsibility of medicine and welfare agencies. The medical and biological sciences have made progress in discovering physiological aspects of the aging process, as is shown by the volume edited by Cowdry (10). Private benevolent and philanthropic organizations and public welfare agencies have attempted to provide financial assistance and institutional care for dependent, helpless, and incapacitated old people.

However, the chief sociomedical problem is one of prevention. How can twenty million old people of the next decade be cared for or learn to care for themselves so that they may spend their last quarter of a century happily and usefully? What can medical and social science do to assure them a minimum of pain, suffering, and heartache and a maximum of comfort and contentment?

In the past both medical and social work have looked upon the aged as a group needing palliative or remedial treatment. There was little constructive planning for preventive work. If society is not to be overburdened by millions of persons during the last quarter of a century of their lives, extensive preventive measures must be instituted. The length of the period of terminal care must be reduced. People who have been kept alive must be kept active and alert for as much of their lives as possible. Medical science must prevent invalidism and senility; and social science must prevent social inadequacy and dependency if the blessing of longevity is not to become a curse to society.

The pediatrician affects the whole of life through his work in the first six years of the child's life. When the geriatrician and geriatric welfare worker begin their contact, they must often attempt to undo the results of the first sixty years of life. Then they must undertake the responsibility of caring for their clients during the last sixty years. Not that we want to set

120 years as the limit of life! Such a limit seems improbable in view of recent records of longevity and the forecasts of science (11).

Recent experimentation has shown that the greatest hazards to the physical and mental well-being of older persons are sociogenic and psychogenic factors. A study was made in England a few years ago to discover the "social causes of admission to mental hospitals." Drs. Lewis and Goldschmidt (12), searching for common causative factors, found that "failure to retain a place in the community, to be a member of a family, to have an appreciated share in the life of some household or working group has been common in patients studied." They concluded that "this defect of social integration is powerfully adverse to mental health."

G. D. Hamilton (13) in his discussion of "Changes in Personality" states: " . . . Various facts of clinical experience tend to support a guess that the memory impairments of ageing persons may be in part a psychogenic phenomenon and one that is not wholly irreversible. Therapeutic work with persons in the seventh decade includes among its aims the reduction of discomforts and disabilities by bringing about a more extroversive attitude toward the current realities of everyday life and a more self-confident approach to its problems. It is a suggestive finding that this usually effects a distinct improvement of memory for recent events."

Social case workers who have aging clients may be able to throw some light on the social causes of senility and the steps leading to physical and mental decline. The meager evidence today available suggests that social as well as physiological factors are involved. It now appears quite certain that forgetfulness, mental confusion, and hallucinations, once considered the results of physical aging, may be socially induced. These manifestations, as well as feebleness, dizziness, and pain, may be unconscious mechanisms for getting attention or attempts to avoid boredom and unpleasant reality or to escape from the perplexities and disappointments of life (14). It becomes imperative that the doctor treating aged persons have a knowledge of the cultural configurations and social pressures impinging upon the individual, or that he have on his staff a geriatric social worker.

### Increasing Need for Geriatricians

Geriatricians will become increasingly necessary as consultants to social work agencies, benevolent societies, churches assuming responsibility for older members, housing authorities, recreation centers, and state and local planning boards. In the field of physical medicine it is likely that both occupational therapy and physical therapy will develop specialized techniques for preventing or alleviating the problems of aged people. The science of dietetics will likewise look to the geriatrician as well as to the food chemist for advice regarding the scientific food problems of older people. Restaurants for old people, for instance, may need to have geriatricians as staff physicians or consultants.

Surely an important part of the doctor's job will be allaying the fears of the patient and enabling him to distinguish between services that he may perform for himself and symptoms that require medical attention. The geriatrician, like the pediatrician, may find social psychology one of his essential tools.

Perhaps geriatrics will offer new opportunity for the woman physician, just as was the case with pediatrics. There are many similarities. Men relinquish willingly to women the care of the helpless. Traditionally women have tended the babies and dealt patiently with the decrepit aged. Women physicians may demonstrate special aptitude for geriatrics.

A solution of the problems of the aged demands revolutionary changes not only in methods of treatment but also in the social attitudes and institutional patterns of society. Geriatrics and the welfare of the aged therefore challenge the skill and imagination of experts. Lawrence K. Frank (15) has summed up the possibilities for the future as follows: "To the extent that the education of children and adolescents and the growing programs of adult education can and will attempt to help individuals to meet life situations more effectively and realistically, in terms of the new understandings and insights and awarenesses that are now becoming available, we may be able, with mental hygiene and preventive medicine in childhood and adolescence, to build a wiser and happier pattern of life for the older person in the midst of our changing social scene."

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# WHAT IS OLD AGE?

Lucas A. Miller, M. D.

JUDGING by present trends, before the present century is over the senescent population will equal if not exceed the preadolescent population. How is the average practitioner who has concerned himself largely with obstetrics, children's diseases, and the infections of middle age preparing himself to meet the situation?

Until very recently the man over 60 has been the forgotten man of of medical literature. Geriatrics, that division of medical science which has to do with senescence and the diseases and infirmities of age, has had little attention. The medical profession has looked upon the infirmities of age as inevitable and the closing years as an endurance test to be suffered with stoic resignation. When the writer began this study the very word "geriatrics" was unfamiliar. Moreover, the subject is not a spectacular one and offers small opportunity for brilliant experimentation and provocative case reports.

The physician's responsibility begins before senescent changes set in. Many of the disagreeable symptoms that characterize senility might be avoided by consistent cultivation of healthful habits of living and thinking in middle age. In age, as in war, intelligent preparedness prevents later casualties.

Throughout the ages many fantastic formulas have been offered in an attempt to arrest the deterioration of age and restore youth. The fabled fountain of Ponce de Leon, the black magic of Faust, and the Shangri-la of James Hilton are all part and parcel of man's ancient dream of persuading time to "put up his caravan," of the heart of man sad, in the words of the song of the South African Veldt, because he "yearns for his youth to stay."

A curious article on longevity in the *Athenian Mercury* in the seventeenth century summarizes the findings on remedial medicines up until that time. They are diet, special herbs, astrology, resort to the philosophy of the Stoics, milk from the moon's rays, elixir from the beams of the sun, or a broth brewed from the influence of the stars. "Such medicines," the editor admits, "are difficult to procure, but no doubt efficacious." Philosophers, astrologers, physiologists, chemists, and endocrinologists have all had a try

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THE LATE DR. LUCAS A. MILLER of Colorado Springs, a member of the American Medical Association and of his state and local medical societies, practiced medicine for almost fifty years. He was a frequent contributor to medical journals and for many years had a special interest in problems of aging. Before Dr. Ignatz Leo Nascher coined the term "geriatrics," Dr. Miller had begun a notebook on the subject of longevity. The present article is based in part on this notebook, kept over a period of twenty years.

at a "Methuselah formula," and have left records of experiments which credulous followers have promptly converted into cults and isms.

Since the seventeenth century investigation has been taken over by the biologists and biochemists. Today we must search for the elixir of life in the test tubes of the research laboratories.

Out of the laboratory comes a theory that sounds almost as fantastic as an ancient potion. Dr. James E. Kendall of Edinburgh University suggested that the drinking of "heavy water," discovered by Professor Urey and his colleagues at Columbia University, might slow down functional processes and reduce bodily wear and tear without seriously impairing the faculties. Professor Urey disclaimed any responsibility for the longevity idea in connection with his discovery. Human experimentation is difficult and, in this case, expensive, and Dr. Kendall's theories remain unverified. Modern man is suspicious, too, of any remedy that lowers his speed. He prefers fifty years of adventurous living to a century of possible vegetation.

A comparatively large number of persons have established an immunity to disease and have kept their wits nimble to the century mark, and even beyond. They have demonstrated that there is no fixed limit to the human organism and no divine decree that limits the span of life to the biblical three score and ten. Chevreul, the chemist, was astonishingly virile at 100 years, and lived three years longer. *Life* magazine in its issue of January 11, 1937, shows photographs of him in animated conversation, his broad and tolerant words demonstrating an extraordinary fluidity of mental processes: "Except for the moral feelings of an honest man I am ready to give up everything I am doing if it is proved to me by experience that I am wrong."

In normal healthy persons, such as Chevreul, no secret potion is required. Nature does the work of rejuvenation and furnishes her own materials. The process of reconditioning is going on constantly. But unfortunately not all persons age in this normal manner, and nature often needs help.

Colloidal chemistry in connection with cell repair was attracting much attention before World War II more or less silenced the laboratories. Dr. Frederick Macy (18) is positive that life has been prolonged by colloidal action. He prophesies that further research and better knowledge of the subject will certainly result in prolonging the normal term of existence. David Graham, a British chemist, first gave out the idea of colloid metals. Dr. Steinmetz first used colloids in the treatment of sinus troubles. Goitre is subdued by colloidal iodine, and a combination of gold and iodine is used in chronic alcoholism. The results of animal experimentation strengthen the hopes of research workers.

The subject is complex, but a simple statement of what is meant by colloidal chemistry may be possible. The human body is an aggregate of cells; its tissues and organs are made up of them. The life energy of these cells is supplied by certain minerals and metals, of which thirty-two have been recognized, including iron, iodine, manganese, and copper. Colloidal chem-

istry breaks up these elements into minute parts, so that they can be utilized. Exhausted and broken down cells are attracted to these artificial colloids, just as iron filings are drawn to a magnet. They take what they need for repair, and normal harmonious balance is restored. What the future may hold through further understanding of their administration we can only guess.

These marvelous discoveries are not being kept in some secret vault. As fast as possible the results of experiments are made public. Dr. Macy's demonstration on a faded flower before a selected group of investigators holds much of hope for human rejuvenation. He placed a wilted orchid in a quart jar of water. Then he added a teaspoonful of an amber liquid—colloidal copper. The crumpled petals gradually expanded and the color returned. The flower not only freshened, but held its beauty for more than two weeks.

"The study of these phenomena constitutes the road to the ultimate in human knowledge," declared Dr. Macy (18). What a challenge to science to explore the hidden processes of "man the unknown."

Age is a natural progressive process. Healthy old age (senescence) differs from disease in advancing years (senility) in that it is a slow, almost imperceptible process. Changes come about so gradually and are so widely distributed that they fail to attract attention. When going up a gentle mountain grade the traveler never realizes how high he has climbed until he pauses on some level spot to look down on the valley below. And it is only when one looks back several years that he is able to notice any change in his physical vigor or appearance. The man of 65 is probably as spry as he was a month ago, almost as nimble as he was a year ago; but when he recalls the springing step of ten years before he realizes that the tempo of advancing years is upon him.

Until a man is 50 he should rally quickly from fatigue and should sleep soundly and rise refreshed. The normal senescent (after 65) should not be a victim of insomnia, rheumatism, or other disagreeable symptoms. He should refuse to think of himself as old. The negative epithet of "old man" has hustled many a useful citizen to the scrap heap. A man between the ages of 65 and 80 may refer to himself as a *"senescent";* if he is past 80, he may claim the dignified title of *"longevite."* Both these terms are positive and carry no derogatory implications. The normal senescent feels "fit as a fiddle" and the normal longevite greets each day with fresh interest and serene common sense.

When Dr. Louis I. Dublin classifies as "old" all persons over 65 he is speaking chronologically. He refers to their civil age, which can be reckoned by dates on a calendar. Man's physiological age must be reckoned from his changing tissues; it must be read in the processes of growth, repair, and deterioration. Dr. Alexis Carrel (3) wrote: "Changes which occur in our tissues from embryonic life to death are indelibly written in the body structure.

The past in its entirety probably follows us at every instant." The number of years a man has lived may bear little relation to his real age. Some persons are vigorous at 70, others are senile at 40. Aging cannot be standardized; it is an individual affair. It is determined by the running down of vital processes, a gradual diminution of life energy, and may appear early or late.

To realize how and why we grow old we must understand something of the processes of growth, development, repair, and degeneration. Growth is an essential function of all living things. Certain histochemical changes begin gradually after maturity and continue through middle life and old age. In infancy, childhood, and youth there is growth and development; at maturity there is quiescence for a time—an apparent standing still; then comes old age with its process of turning back upon itself—retrograde evolution or involution. Although this process is inevitable and irreversible, time is not the causative factor. There is no rigid limit of duration for the human organism.

We begin our life development with immense energy which extends the body mechanism through cell multiplication. We grow in size, and each organ and part becomes more highly specialized. Although the adult does not increase appreciably in size he still maintains active cell growth for purposes of repair. When cell activity fails to keep up with processes of degeneration, death ensues.

The rate of growth seems to influence susceptibility to degeneration and length of life. According to some investigators, something is consumed in slow growth that is essential to longevity. Quick growth in young animals, although apparently a sign of well-being, is followed later by a rapid loss of vital energy. In countries where women mature early they are old at 30. Diminution in the intensity of growth marks the beginning of senescence in all organisms. Where we find that living to an advanced age is common, we shall confidently expect to find an extension of the period of youth. The frequency with which we meet delayed maturity in long-lived families leads to the conclusion that slow growth is a fairly definite promise of a ripe old age.

Each living thing, according to a résumé by Roy Helton in *Harper's Magazine* grows to a point of maximum power and then scatters. The old man is less unified, less firmly integrated. "Old age is a process of diffusion of energy." Charcot (4), who made the first detailed study of old age, remarked this tendency long ago: "The organs seem, as it were, to become independent of one another."

Life has been extended in animals by subjecting them to low temperatures, thus creating a state of lethargy. Laboratory experiments of Jacques Loeb (12) and J. H. Northrup proved that temperature bears an important relation to duration of life. Fruit flies kept in a temperature of 86° F. lived, on an average, 21 days; those kept at 68° F. averaged 54 days; while those that lived at 50° F. reached the remarkable age of 177 days.

We might imagine a man put in cold storage by order of Queen Elizabeth and awakened for the coronation of her namesake, though unfortunately his comments would have small value, since consciousness would have been lost in the interim. Did the trolls, perhaps, pack Rip Van Winkle in dry ice? Recent experiments with human beings subjected to low temperatures for a long time indicate that the lethargy thus induced may materially stay the ravages of certain incurable diseases.

The pressing problem of the biologist and biochemist is to find methods of extending youth until it takes over the major part of life. Merely to extend life, without the retention of mental alertness and physical vigor, is a questionable procedure. But to show men how to grow old slowly and uniformly and to retain at 80 that balance of mind and body which we usually associate with the youthful prime is a triumph. Old cells cannot become young again; tissues once differentiated cannot be restored, but the retrogressive process can be stayed or retarded.

Dr. C. R. Stockard raises the interesting question: "Why may it not be possible to stabilize the chemical constitution at twenty-five years and maintain that balance for an indefinite period?" The experiments of arrested growth in plants and animals now being made in the research laboratories make his suggestion seem at least possible in some future state of enlarged understanding. Certain eastern savants have reputedly lived to an incredible age. Did they discover the inhibiting substances of the body colloids and cells and bring about histochemical changes that prolonged their youthful vigor? Is there a "lost horizon" of human understanding?

Some aged persons seem to have established immunity to disease; they are able to resist infections. But such longevites do die, eventually, at ages varying from the comparatively common century mark to the reputed 154 years of the amorous Turk looking for his twelfth wife. With such longevites the machinery of life simply runs down like the one-hoss shay.

Some day almost everyone may die of old age, according to Dr. Carrel. The successful use of sulfanilamide in the treatment of certain bacterial infections that have usually ended fatally and the new therapy for insanity and syphilis will lower the death rate and raise the life expectancy. Eighty-six per cent of those in middle life are now carried off by acute or chronic infections. We confidently expect a startling change in these figures. Fewer people will succumb to the preventable diseases, and more people will run down naturally. Man has not conquered the last enemy, death, because it is an innate quality of living matter, the natural end of a progressive development.

Laboratory experiments carried on at Johns Hopkins, Rockefeller Institute, and elsewhere indicate that all essential tissues of the metazoan body are potentially immortal. C. C. Furnas (7) sums up the findings of various scientists in his preview of the next hundred years in the following statement: "The human body is an aggregate of cells and as long as they

function harmoniously we are in health. Men die because cooperation has failed somewhere along the line." Raymond Pearl (15) concludes that it is the differentiation and specialization of function in the mutually dependent aggregate of cells and tissues, constituting the metazoan body, which brings about death, and not the inherent and inevitable mortal process in the cells themselves. It is conceded that cells of the human body, considered apart from the body, have potential immortality, though the organism as a whole dies. Cells grafted on another body live and grow after the original owner has succumbed.

In the causes of old age and death lies the mystery of life itself. The subject has a perennial fascination, and many theories have been advanced which have later gone into the discard because they were based too much upon philosophical speculation and too little upon scientific evidence. Some of the older hypotheses are now matters of curiosity. Bacon's (2) investigations, based upon careful study of birds and mammals, are valuable historically, but many of his conclusions are mixed with traditional ideas and read strangely today.

Minot's (13) theory of progressive loss of energy, which depicted life as one long funeral march from the embryo to the grave, Metchnikoff's idea of the dependence of old age on poisons circulating in the blood, Lorand and Gley's theory of general degeneration of the glands, are all examples of ideas that had their day and their patient experimenters. The process of decay, concluded Dr. Carrel, in *Man the Unknown,* is due to the inability of tissues to eliminate waste. The cells deplete the medium and indirectly introduce into life processes a chemically destructive activity.

Szabo believes that the death of nerve cells is the cause of physiological death. Hackh and Westlin found in dehydration and the formation of heavy water a cause of senility; dehydration leads to transformation of albumin into globulins, which is a phenomenon of aging. Buerger comments on the increase of nitrogen content in advanced age. The solubility of the proteins decreases. The protein molecules go into more stable form. The colloids coagulate and flocculate. Dahr concludes that with advancing age the colloids lose their absorptive power, and that aging associated with dehydration and senescence of body cells is a natural process. This theory is at variance with the conclusions of Pearl (15) and others that the body cells are potentially immortal. The study of the chemical composition of body fluids, plasma, colloids, and cells is of the utmost importance in the study of old age.

"The law of heredity is at the bottom of all calculations as to whether a person is wound up for seventy years or will run down at thirty or forty. There is a certain staying power, a reserve of vitality, which brings resistance to disease and infection." This statement in an editorial in the *Medical Record* is confirmed by Dr. Raymond Pearl (16), who says that

the best insurance for a long life is a parent, or parents, who have lived a long time.

To fix rigid limits to life according to heredity or environment savors of fatalism, and disregards the significant fact that nature often makes a supreme effort to extend life. Medical history has recorded many cases in which a weak biological inheritance has been overcome and a splendid longevity has been achieved. Where there is a short-lived parentage on one side and a long-lived parentage on the other, the tendency is to approach the longer span.

The nervous, cardiovascular, and endocrine systems are the dominating factors in physical well-being, and there are special hazards of the external and internal groups of organs. The external organs, such as the lungs and digestive organs, are exposed to outside infections. Any disease that causes death from a bacillus or virus is an accidental death, just as truly as if the victim had been struck down by an automobile. Most persons who die between 30 and 40 suffer such "accidental death." On the other hand, persons who die in middle life or beyond suffer from failure of some organ from within, such as the heart, arteries, and veins. The failure of the internal organs may also be accidents, and preventable if we knew enough about body mechanisms and functions. They may be due to some clogging of the body which we might remove, or to some deficiency or repair material which we could supply if our understanding were greater.

To put all this in the American language, we grow old because our body cells go on a sit-down strike, and we die because somewhere along the line a nerve filament has burned out or a hormone gone haywire; some bits of tissue go wild; clogging substances cling to the arteries or aorta; a sulky liver lies down on us; or a kidney breaks down. Among such hazards few find the chance to live normally and die a natural death, but a sufficient number are doing it to demonstrate the possibility. Some day we shall get the hang of it.

Medical discoveries are constantly lessening the casualties by the use of new serums, drugs, and new methods of treatment. Better living conditions, sanitation, and preventive measures are working steadily to the same end. In the world of tomorrow men will live longer, whether they like it or not, and the wise man will begin in middle age or before to make some sort of psychic adjustment to advancing years. He will not look forward with sullen dread to old age; he will take it and like it.

The centenarian of the future will not sit in the sun and whittle, or just sit. He will be happily busy, for he will build up an engrossing interest in some activity in the middle years. He may not be able to approach Cicero's picture of the indefatigable Cato, but he will be alert and active and enthusiastic. He will be too preoccupied with life to worry about death. Death will take care of itself; it always has.

Cicero puts this recital in the mouth of Cato at 84: "I am composing

the seventh book of my *Origins* and getting my speeches in shape for publication. I am writing treatises on augural, pontifical and civil law, and studying Greek. I frequently appear in court for my friends and each evening I repeat whatever I have said, or heard, or done, in the course of the day, just to keep my memory in working order. The man who is always living in the midst of such studies keeps his mind at full stretch like a bow and never gives in to old age by becoming slack."

Old age is just the concluding act in the drama of existence and death its inevitable climax—as thrilling an adventure as birth. I suppose no one would accuse Dr. Carrel of sentimentalism, yet in *Man the Unknown* he says: "If the days of advancing age are filled with mental and spiritual adventures they may even recover the richness of youth. . . . Death itself may smile when it is associated with some great adventure."

To live each moment to its full capacity, to adopt sound health habits in youth and a serene philosophy in middle age, will enable the average man to meet advancing years with cheerful equanimity and to look upon approaching death without apprehension.

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GERIATRICS

*Official Journal of the American Geriatrics Society*

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## THIRD ANNUAL MEETING, AMERICAN GERIATRICS SOCIETY

THE THIRD annual meeting of the American Geriatrics Society was held at the Hotel Commodore in New York City from June 13 to 15, 1946. The papers read at the meeting were of exceptionally high quality and it is planned to publish as many as possible in this journal. Those who attended the meeting, whether or not they took part in the discussions, manifested an interest rarely to be found in any scientific gathering.

It might be well to call attention to the fact that this society is international in scope. Any physician especially interested in geriatrics who is a graduate of a recognized medical school and a member of a state medical society is eligible for membership. Associates are lay persons who are especially interested in geriatrics, such as Ph.D's, physiotherapists, hospital superintendents, registered occupational therapists, directors of homes for the aged, social and welfare workers, and similar responsible persons. No faddists or cultists are allowed membership. It is the purpose of the society to encourage and promote the study of geriatrics. Stress is laid on preventive geriatrics—the association of preclinical medicine and geriatrics. Thus the internist who applies preventive methods (preclinical medicine) to pa-

tients between the ages of 30 and 50 will do all he can to prevent disabling and discomforting diseases in later life. However, geriatrics (the care of the aged) begins at 50 and gives special attention to the ills of the person of advancing years. It is a logical combination of studies to combine preclinical medicine and geriatrics in a special study, namely, geratology.

The society is considering granting charters to societies in various cities and states which will be under the jurisdiction of the parent society, but will be able to hold their own meetings and carry on special scientific studies. The society will probably have an education committee which will function to assist colleges, medical societies, and other bodies to arrange special programs for the study of geriatrics.

Dr. William F. King, Director of the Department of Adult Hygiene and Geriatrics, Indiana State Board of Health, and Capt. William Seaman Bainbridge, USNR, were elected honorary members of the society. The next meeting will probably be held in Atlantic City, where the society was organized on June 11, 1942, by Drs. John A. Bolster, Edwin B. Gammell, James M. Northington, Lucien Stark, Malford W. Thewlis, and Carl A. Williams.

A.E.H.

## THE OBLIGATIONS OF AGE

A JOURNAL devoted to fitness in old age and the elimination of avoidable handicaps may well encompass the widest field of endeavor and understanding. Serenity in old age connotes the circumvention of a vast and varied array of potential adversities.

In fact, life is often likened to a mariner's piloting of turbulent seas, and it is even hinted, somewhat dolefully, that the only certain haven of security and refuge is death itself. The geriatrist cannot subscribe to any such profile and logbook of life. The high seas hold no terror for those qualified to ply them and adequately equipped to meet their buffeting. And so it is with life.

We need these concepts to stiffen our resolution in the present world plight of postwar impoverishment, starvation, and international suspicion. A definite obligation settles upon older people in all countries, not only to keep children from bodily starvation, but also to keep adolescents and younger family groups from mental and spiritual decay. For example, it is now evident that the older groups in the starvation zones—Holland, Greece, Poland, and China—survive their ordeal with less permanent stigmata of deprivation than do the very young, who are dwarfed and thwarted in their growth fulfilment. This situation is easily understood, and Herbert Hoover's efforts repeatedly attest that understanding.

Starvation is an old and recurring human dilemma. It has shown abatement only as the good soils of the earth have multiplied their production with the aid of animals and power machines.This means industrialization and the

upbuilding of urban centers dependent upon raw sources of power—oil, coal, hydroelectric energy, and even nuclear fission. Deprive enough people anywhere of these resources and reasonable access to world interchange of goods and there can be no peace.

Those who seek to prevent disease and promote life extension should realize that health, like money, is important only as a means to an end. The people of the earth must have the means to secure the food, goods, and services essential to them, and the capacity to join adequately in producing them. Nothing less than overwhelming peacetime production, comparable to that of the all-out wartime effort, can pull the world out of its present dismay.

E. L. T.

## WANTED—RESEARCH IN GERIATRICS

THE increase in absolute numbers, and especially in proportions, of living persons at the higher age levels serves to accent a problem that has always existed. The need for more knowledge about senescence is not new. Keeping more people alive till senescence simply makes the demand for information more pressing from a practical point of view.

A journal devoted to this field has many obligations and many opportunities. It can and should serve to diffuse existing information and publish new knowledge of importance to medical practitioners and scientific investigators. It can also stimulate study of problems of basic importance to geriatrics. In fact, unless it does so its usefulness will be small, for the areas of current ignorance about matters geriatric are much larger than those of enlightenment. That fraction of the medical profession interested in the problems of age and aging has an opportunity and a challenge to promote research in these fields.

Stimulating research is much easier to talk about in general than to do something about in particular. Two basic needs always confront one. First, there is the problem of suitably trained workers, and, second, there is always the question of support. Although it may seem to some like putting the cart before the horse, the money can best be provided first, because men are attracted by money.

This country expends a negligible sum of money on medical research outside of industry. The exact amount is hard to ascertain, but it is probably not more than ten or twenty million dollars annually. With a hundred billion annual income, this sum is a pittance and a disgrace. If the search for facts that may improve health and lengthen useful life is not worth more than two hundredths of a per cent of our annual income, then life itself is surely not held very dear in any intelligent way. When nearly half of our population can expect to live to age sixty it would seem that a few more hundredths of a per cent of its current earnings could be put into making life at that age more productive.

This journal can play a major role in arousing interest in support of research on the problems of aging. It can help in obtaining the establishment of the proposed National Science Foundation, the bill for the creation of which, as of June 1946, is lying peacefully under a pile of more pressing legislation in the Senate docket. No medical group has more interest in research support than does that interested in geriatrics, because no medical problems are more in need of study. When and if the National Science Foundation Act is passed, appropriations must still be made. Physicians can exert great influence on the adequacy of such fund allocations by informing their congressmen about the real problems.

Private donations for temporary support of research on aging are needed now to get work under way before Congress acts. It is to the great credit of the American way of life that private donors have made large contributions to scientific progress, both in medicine and in other fields. Private gifts, large and small, have in the past supported a large share of scientific research. Geriatrists can now encourage such enlightened disposition of money in the direction of research on aging.

This journal will serve well if it helps to promote progress in both the theoretic and applied aspects of geriatrics. It cannot do so unless its editors, its contributors, and its readers all see clearly the entire picture of the needs of the field and do something about them.

M. B. V.

## AMERICAN GERIATRICS SOCIETY

### Officers 1946-1947

The following officers for the year 1946-47 were elected at the Third Annual Meeting of the Society held in New York, June 13-15, 1946.

*Honorary Fellows*:

Lt. Col. John W. Shuman, Sr., M.C., U.S.A.
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Miss Alison Vickery, *Chairman*
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Attleboro, Massachusetts

## CORRESPONDENCE

*Are Old Men at the Throttle the Cause of Railroad Accidents?*

To the Editor of GERIATRICS

Sir:

Are railroad wrecks caused by old men at the throttle? A railroad accident in the spring of 1946 raised this question. Such facts as could be gleaned are here presented for analysis. The disaster and the issues arising from it present some important angles for the consideration of physicians interested in geriatrics.

On April 25, 1946, the *Exposition Flyer* of the Burlington Railroad, traveling 85 miles an hour, crashed into the rear of the *Advance Flyer* at Naperville, Illinois, killing 45 persons and injuring others. The engineer who ran through a reported warning yellow light and red stop light before crashing was 68 years old. The engineer of the train struck, which had stopped unexpectedly, was 67 years of age. Throughout the country the advanced

age of the engineers was headlined as the cause of the seemingly unexplainable disaster.

The following statements are representative of newspaper comment and criticism.

"The engineer of the Exposition Flyer was 68 years old and had worked for the railroad for 42 years. He was able to walk away from the wreck, but probably wished that he was numbered among those who were killed. . . . We want something done about the system that puts men of his age at the throttle of most of the high speed railroad trains now operating in the United States. That is a criminally hazardous gamble with the lives of railroad passengers. It is a gamble that has lost more than once in the last few years."

"The presence of two elderly engineers in the cabs of the Burlington streamlined trains involved in the wreck Thursday in Naperville was neither a coincidence nor unusual, a survey of the principal railroad officers disclosed. Almost without exception engineers on the premier trains are men past sixty. They have their jobs because under the universal rules of the seniority imposed by the Brotherhood of Locomotive Engineers, they can demand the runs that pay the highest wages and offer the pleasantest working conditions."

"Both the engineers of these fast trains were past the voluntary retirement age of 65 set by the U. S. Railroad Retirement Board and only a few years short of the mandatory retirement age of 70 which is set by the Burlington. Other railroads have higher limits. On one of the fastest trains, the regular engineer is 76 years old. He shares his run with another engineer who is 70 years old."

"The railroads are using men sometimes with failing sight, of slowed-down reactions, subject to all of the little vexations of age which handicap physical efficiency and mental alertness, to drive trains that sometimes reach a speed of 100 miles an hour. That is wrong and it must be stopped."

"When seniority puts men in jobs which endanger lives and which, incidentally, subject the men themselves to mental strains that they should not be required to undergo at their age, seniority needs to be modified. Old men on 100 mile an hour trains are a dangerous combination."

"An engineer's reluctance to quit at 65 has its source in the difference between his earnings while he is active and his pension. The only bar to service at 80 on some railroads, without a mandatory retirement rule, is failure to pass a physical examination. On the Burlington, all engineers must take an examination every two years until they are 50. After that, they are examined annually. Other railroads have different physical standards. Some require an examination only once every four years. Almost without exception, defective vision that can be corrected by glasses does not bar a man from his job. Would not, however, younger and more alert men, faced with emergency circumstances, avoid such a wreck as this one?"

"Although no figures are available to show the relation between age of engineers and frequency of railroad accidents, the National Safety Council has published studies which show that persons past 65 have an accident frequency 58 per cent higher than the average for all automobile drivers. They stand second in all age groups, being exceeded only by drivers of teen age in number of accidents. Air line pilots face more stringent regulations than all others with respect to age, with physical examinations every six months. For this reason their length of service expectancy is much less than for most other professions."

### What Appear to be the Facts

In the midst of all these accusations, controversies, and stirred public opinion, let us turn to the other side of the picture for a moment for such information as was actually given out at the time by those in a fair position to know the facts.

Blaine, the engineer driving the train, who suffered a fractured skull, and against whom a charge of manslaughter was at once lodged, stated that his braking power was insufficient to halt his train in time, although he saw the warning lights. Traveling at almost 85 miles an hour, with a light train, even though he applied emergency brakes and took every other safety measure possible, he was unable to halt his train in time.

The railroad company stated: "Blaine, the engineer, was given physical tests some two months before by the company physicians and passed with perfect marks in all respects—vision, heart, nervous reactions, and all others. He had perfect vision and did not need to wear glasses for distant sight."

A flagman on the other train said he did not drop any warning flares when the Advance slowed down for an unscheduled stop at Naperville, Illinois, and did not set in operation the oscillating warning lights on the rear of the train, as he had no time to do so. It was estimated that the Exposition's speed had dropped from 85 to 50 miles when it hit the Advance. This declaration surely indicated that the engineer was trying to stop. Certainly his mental and physical reactions must have been instant and good to do this.

A trainman on the Exposition reported that the application of Blaine's brakes felt like a normal application of brakes. A flagman on the Advance, when the train made its emergency or unexpected stop, rushed from the rear car and ran up the track to flag down the other train, but in a matter of seconds the collision occurred and he was too late. "I couldn't say exactly what happened," seemed to be the confused answer of most of the crewmen.

Tests were made later by the company over the same run with a special diesel train duplicating the *Exposition Flyer,* which crashed into the rear of the Advance. They reported: "Full application of the emergency brakes at full speed upon sight of the train or red lights would not have avoided the disaster, although the loss of life would not have been so great. On the other hand, the collision might have been avoided if the engineer of the *Exposition Flyer* had brought his train under control when he first sighted the yellow cautionary light."

It is evident that a slight curve in the road may also have prevented clear vision far enough ahead for the engineer to act more quickly than he did.

Whatever may be said pro and con, of Age versus Youth, of public damnation of old men at the throttle, the fact remains that the two fast-running trains were so close together that the unexpected slowing to a stop of the Advance in front did not give the Exposition behind sufficient time

to stop or comply with any rules that might have averted the disaster. The same thing might be said of signals from the first train, as the accident occurred so quickly that all human agencies would seemingly have failed to avert it.

To claim flatly, as all the newspapers did immediately, that a younger engineer would have avoided this wreck is stating something that seems not proved at all. Indeed, it is reported that "one leading eastern railroad authority who made a study of the subject some 15 years before found that men over 60 had better safety records than younger engineers." The engineer on the train forced to slow up and struck by the other one was certainly not wholly responsible either, if the rear guard danger signals were not given by the other trainmen in their respective positions in time to avert the catastrophe.

## The Case for the Engineers

The older engineers with whom I have come in contact have all been unusually alert and healthy men with a full sense of their responsibility. One would go far to match them for carefulness and a determined desire to round out their term of usefulness without an accident of any kind. Their long experience as trainmen was certainly invaluable. If the shoe had been on the other foot and these engineers had been very young men, without doubt they would as quickly have been charged with manslaughter and accusations would have been made on the basis of their inexperience, lack of caution, and disregard of tested safety rules. Public clamor for an immediate scapegoat in disasters of this kind is so strong that injustices are done and not corrected until long afterward, and sometimes never. The weight of blame placed upon these engineers because they were elderly and enjoyed well-earned seniority rights, can do much damage to such groups for years to come. It is particularly unfortunate now at a time when longevity is increasing and the growing usefulness of elderly men in many pursuits is recognized.

## Conclusions

The answer to these differences of opinion about the relative usefulness of various age groups lies in frequent physical examinations. The medical examiner, with his records and charts before him, is in a position to judge accurately and positively the individual's qualifications for the job at hand. It is the only fair and impartial way of placing all workers upon the same basis—a right to which all are equally entitled. We must remember also that accidents can and do happen from unexplained mechanical and human causes that are difficult of analysis. Such accidents may seem to have been almost unavoidable as judged by all accepted standards of prevention. The public safety must of course be preserved in every way possible. Let us be sure,

however, that in our quick judgment and censure innocent men are not made to suffer unjustly just because they happen to be beyond the age of 65.

HENRY G. LANGWORTHY, M.D.

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NOTE. The writer of this letter is Treasurer and Director of Foundation Funds of the Interstate Postgraduate Medical Association of North America, Director of the Schneider Eye Research Foundation, and a member of the American Geriatrics Society.

TO THE EDITOR OF GERIATRICS
Sir:

We are very desirous of forming a society of geriatrics in Waterbury, Connecticut, and would appreciate any information or help that you may be able to extend to us, either through communication with other geriatrics societies or medical schools that conduct such a course.

Hoping you will be able to give us some assistance, I am

Very truly yours,

ARTHUR F. SULLIVAN, M.D.
*Acting Secretary*

111 West Main Street
Waterbury 32, Connecticut

## RESEARCH ASSISTANTSHIP IN GERIATRICS

THE Department of Medicine of the New York Post-Graduate Medical School and Hospital has available for September 1, 1946, a Research Assistantship in Medicine, for a detailed clinical investigation of the aging process in its various phases. Stipend begins at $2400 yearly, in proportion to qualifications of the candidate.

Requirements include graduation from a Grade A medical school in this country and several years of training in an approved hospital preferably a residency in medicine.

Inquiries and applications should be addressed to the Department of Medicine, New York Post-Graduate Medical School and Hospital, 301 East 20th Street, New York 3, New York.

# *Digests* FROM CURRENT LITERATURE

## General

**The Care of the Aged. Observations based on Experience in Glasgow Outdoor Medical Service.**

M. Curran; J. Hamilton; J. S. Orr; W. Poole; and E. N. Thomson (District Medical Officers). *Lancet*, 1:5: 149-52 (Feb. 2), 1946.

Data are given on 1001 old people living in the community of Glasgow, Scotland. The authors believe that with only a little effort more could be done to make the evening of their lives more comfortable, happier, and less lonely. The results of such an effort could be engrossingly interesting.

The fear of institutions which still savor of the poor law is a constant cloud over the aged. Regimentation and loss of individuality associated with large institutions, so familiar from Dickens's novels, are an actuality to old people. Only 51 out of the survey agreed voluntarily that they might consider going to a home.

When eventually the old person becomes incapable of self-care some voluntary system of help must be brought into action. No system of paid help is equal in efficiency to the voluntary efforts of those regarding care of others as part of their vocation in life. The present organizations that care for the aged should receive an abundance of help.

A large number of old people could be looked after in their own homes by carefully chosen, well-trained "home helps" who look with interest upon this type of work. They could be the outdoor staff of institutions that will eventually admit the old people when they can no longer be cared for at home. Many such homes are already doing good work, but the number of people cared for is only about 5000 in the district under consideration.

Medical attention should be entirely free, and should be in the hands of middle-aged practitioners who have an understanding of and sympathy with the difficulties of the aged. Every suggestion of charity must be strictly avoided; the old person must realize that this service is his by right.

In the postwar housing schemes plans for small dwellings for old couples and solitary old people in the proportion of not less than 10 to 15 per cent of the total number of dwellings should be included. 6 tables.

**Hostels for the Aged.**

A. D. Symons (Medical Officer of Health). *M. Officer*, 74: 192 (Dec. 8), 1945.

There will be an ever increasing number of elderly people who are no longer a productive portion of the population and cannot manage to look after themselves. They will need material assistance to allow them to spend their remaining days in serenity of mind, even if their bodies are subject to the degeneration of senescence.

It is suggested that some state scheme of domestic help of a whole-time or part-time nature be introduced; however, domestic help is not a complete answer to the many problems of old age and its infirmities, since it does not entirely compensate for loneliness.

Aside from the many boarding-houses for the well-to-do and alms-houses for the poor, there are relatively few hostels conducted by philanthropic effort for those old people who are neither well off nor destitute.

In planning community housing in the future, the small house with a single bedroom or two bedrooms should be incorporated. Such a house would serve elderly couples, widows, widowers, or spinsters.

For elderly people who are failing physically and mentally and who are living alone there is only one solution, namely, the public assistance institution. Something definite is needed, whether provided by the municipality or by philanthropy, to prevent elderly people from sinking into a state of permanent unhappiness and losing their self-respect.

The author is of the opinion that small hostels for the aged might be considered. He envisages rather small hostels (not large, soulless institutions) in which elderly people can have their private sitting rooms, adorned with cherished personal possessions, as well as a public sitting room and a communal dining room. Aside from the necessary staff for housekeeping, there should be a resident or daily visiting nurse who could attend to minor maladies and advise the old people in serious cases.

If a municipality is to strive for the health and happiness of all its citizens who need help, the old should not in future become another "Forgotten Army."

**The Limitation of Creative Years.** JOHAN BJORKSTEN. *Scient. Monthly,* 62:94 (Jan.), 1946.

Reference is made to Dr. Lehman's article in the *Scientific Monthly* for August 1945, with regard to the creative years, and the extensive compilations upon which his conclusions are based. The author does not quite agree with these conclusions. He points out that as a man advances and attains recognition in intellectual fields he is usually burdened with an increasing load of administrative, social, financial, or other noncreative duties which sharply reduce the time he is able to devote to his creative work.

In the case of the industrial scientist, it is well known that the man who has made his mark at the age of about 30 will usually be promoted to functions in which he no longer has the opportunity to devote himself exclusively to personal creative work. The same situation obtains in large sections of academic work. Therefore, the curves showing absolute performance in relation to the age factor are in reality composite between performance curves and a curve showing the decreasing amount of time the scientist is able to devote to creative functions.

The diagram (Figure 9) in Dr. Lehman's paper, entitled "Why Genius Withers; Age versus Output in Chemistry" is referred to. The author is of the opinion that the decrease in absolute results is due, not to sharp decline in creative capacity, but to a decline in the actual daily working hours freely available for undisturbed pursuit of creative tasks.

It is therefore submitted that if the true capacity for creative output is to be computed for any age the absolute value of this output is not sufficient; the output divided by the number of hours free for such use is much the truer indication, and the neglect of this time factor will significantly distort any inferences.

**Gerontology Comes of Age.** EDWARD J. STIEGLITZ. *Scient. Monthly,* 62:80-82 (Jan.), 1946.

Until recently biologists and physicians have been strangely content to take aging as a matter of course, and the problems of aging were largely of academic and theoretical interest. This situation is now changed. In the past

fifty years preventive medicine, sanitation, and improved therapeutics have dramatically raised the age of our population. The increase in age was accelerated in the past decade. At the turn of the century the average life expectancy was about 47 years; today it exceeds 63. In 1900 only 17 per cent of the total population of the United States were 45 years old or more. In 1940, 26.5 per cent were over 45; and conservative projection leads us to expect that in 1980 more than 40 per cent will be over 45. Data from the 1940 census reveal that the number of persons aged 65 or more increased 35 per cent in the past decade. There are now about 9 million people over 65 in this country.

However, the increasing millions of older men and women will remain an urgent problem and a potential menace to national economic equilibrium until we know more about aging, how to maintain health into senility, and how to use wisely the changed capacities of those past the meridian. The logical divisions of gerontology are: (1) the biology of aging, the phenomena of evolution or development, and the phenomena of involution or senescence; (2) the medical problems of aging man; (3) the socio-economic problems of aging mankind.

Man is composed of myriads of cells functioning in complex harmony. The fundamentals of the biology of senescence form the basis for advances in clinical knowledge and application. Therefore the biological sciences are highly significant in this field. Similarly, men and women constitute the basic units of collective society, or the body politic. Sociology, biology, and medicine constitute the triad of facets.

The future of gerontology is bright. There is much to be learned about aging, and we need to learn *now*. Gerontology will continue to mature. If its further maturation is wisely guided, mankind will be enabled to make good use of the increased longevity attained.

**Life's Later Years. Studies in the Medical History of Old Age. Part 10.**

FREDERIC D. ZEMAN. *J. Mt. Sinai Hosp.*, 12, No. 4:939-53 (Nov.-Dec), 1945.

The first work on old age which appeared in England was *Medicina Gerocomica,* by Sir John Floyer (1649-1734); it was published in 1724, when the author was 75 years of age. Johann Bernhard von Fischer's pioneer book *De senio eiusque gradibus et morbis* appeared in 1754; in this work the foundations were laid for the scientific approach to the problems of senescence and disease in the aged. In most books of the seventeenth and eighteenth century that discuss cases of patients over one hundred years old the outstanding symptoms reported are marked arteriosclerosis, aneurysmal dilatation of the aorta, and cartilaginous thickening of the aortic valve.

Other celebrated British physicians of that period were: George Cheyne (1671-1743); Robert Welsted (1671-1735), who stressed Galen's admonitions against overeating and excessive drinking; and Richard Meade (1673-1754), whose *Medica Sacra,* including a chapter on old age, appeared when the author was in his 77th year.

Giovanni Battista Morgagni (1681-1771) published *De sedibus et causis morborum* when he himself was 79 years old. Albrecht von Haller (1708-1777) was a celebrated Swiss physiologist. His idea of the pathogenesis of arteriosclerosis is of great interest, since it antedated Antonio Scarpa, the Italian anatomist and surgeon (1747-1832).

John Fothergill (1712-1783) devoted a great deal of time to the study of angina pectoris; his interest was probably inspired by William Heberden the Elder (1710-1801), whose book on this subject appeared in 1768.

Easily in the first rank of medical amateurs stands Benjamin Franklin

(1706-1790). The reader will recall his substantial additions to the welfare of the elderly, such as the flexible catheter and the bifocal lens. His physician was Benjamin Rush of Philadelphia (1745-1813), whose writings cover a wide range of medical topics, including old age.

Bibliography of 44 references. 5 figures.

**Preventive Medicine Throughout the Life Span: Geriatrics.**

EDITORIAL. *M. Woman's J.*, 53:31-32 (Jan.), 1946.

According to Nascher, "Senility is a physiologic entity like childhood; not a pathologic state of maturity . . . . Diseases in senility are pathologic conditions in a normally degenerating body; not diseases such as occur in maturity complicated by degenerations. . . . The object of treatment of disease in senility is to restore the diseased organ or tissue to the state normal in senility: not to the state normal in maturity." Reference is made to Dr. Malford W. Thewlis and his book *The Care of the Aged (Geriatrics)*, of which the fifth edition has been published.

Prevention plays an important role in geriatrics. Physicians should realize that the preparation of the individual for old age comes within the scope of physicians dealing with individuals from infancy on through adult life. The National Institute of Health, recognizing the importance of preventive medicine at all ages, has a special unit for research in the "Biology of Senescence." The prevention of premature senile deterioration and actual organic disease is an important factor in our times. During the war years it was found that those in the 60 to 70 age group contributed to the all-out war effort. Perhaps one of the secrets of good geriatric practice is to keep the aged at work.

As patients enter middle age, they can be given help to prevent too rapid aging. Insufficient sleep, too much stimulating food, alcohol, and tobacco, as well as the habit of worrying over work, are important factors to be regulated. Focal infection, nutritional disturbances, changes in metabolic rates, excitement, and worry should be eliminated. Patients should be cautioned against overweight during the years of middle age. Hobbies should be encouraged. As long as attitudes remain flexible people will remain youthful. When patients are given the right preparation for growing old and there is general recognition of the effect of degenerative diseases on the tissues, as well as of the diseases peculiar to old age, physicians will find geriatrics a fertile and satisfying field of work.

**Characteristics of Mental Health in Old Age. (Charakteristika der seelischen Gesundheit im Alter.)**

A. L. FISCHER, M.D., Basle. *Gesundh. u. Wohlfahrt* (Revue Suisse d'Hygiène, Zurich), 25:197-204 (May), 1945.

A dynamic dualism sets in when physical strength decreases with age and mentality remains strong, for old age does not always signify senility. During senescence the creative impulse may continue to exist, and frequently even surpasses that of earlier years. The individual who experiences it markedly senses the incongruity when biological aging begins, with its decline of physical functions, and yet the impetus and possibility of mental development continue.

The extent to which a person is able to master progressive aging and its consequences depends entirely on his individual attitude toward life and the manner in which experience has taught him to adjust to it.

At present not nearly enough is known about the specific characteristics of aging in individuals of different types and temperaments. This prob-

lem is a most interesting field of study for the gerontologist, whether the subject is considered from the point of view of the physician or the psychologist.

Reference is made to the intellectual alertness of Havelock Ellis at the advanced age of 78, when he defended the cause of aging persons and praised the triumph of the spirit over physical deficiency and the impediments and impairment of health in senescence.

**Occupational Therapy and the Ageing Person.**

LOUIS J. HAAS. (Discussion by EDWARD B. ALLEN, M.D.) *West Virginia M. J.*, 42:10-13 (Jan), 1946.

The responsibility for occupational therapy for the older person should be placed directly upon the physician, who is acquainted with the patient's interests and aptitudes. Older persons are often painfully aware of the fact that they are not as receptive or alert as younger ones. Some therefore refuse to enroll in a class, and many who do soon feel embarrassed and drop out. Some books recently published are especially designed for the occupational therapist and self-taught craftsman. Several of these books are almost entirely graphic and present the technic in such a way that it may be performed at home in the most limited quarters.

From his office the physician may select a "craft text prescription," indicate the first project, and give directions. Follow-up office visits are essential to the success of this treatment. Before the patient can safely ground his enthusiasm in the satisfaction found in achievement the difficulties of making the first few projects must be overcome. The patient can be helped to see the evidence of growing mastery of technic and good workmanship through thoughtfully measured praise; too little or too much praise produces undesirable reactions. As the developing mastery of technic is reflected in more pronounced self-assurance, the physician may advise the self-trained craftsman to enroll in a group course; the individual may be motivated by the physician's assurance that he can now meet competition.

The physician should regulate the time given to such projects. Fatigue and the perils of undue complexity and frustration should be avoided. The patient should be disarmed of possible excuses for discontinuing or failing to finish any task planned for him. When he is ready he should be encouraged to greater achievements. The occupational aide or director should be consulted and his help solicited by the physician. Even the patient whose interests are athletic or literary rather than mechanical will be able to relax better if he alternates with occasional simple mechanical and objective activities.

It is important to remember that the older we grow the more difficult it is to recover our former level of cerebral activity, once we cease our externalization of interest; consequently, we should endeavor to keep mentally active until we die.

**The New Division of Adult Hygiene and Geriatrics.**

WILLIAM F. KING. *Monthly Bulletin*, Indiana State Board of Health, 48, No. 12:286, 299 (Dec.), 1945.

In accordance with an act passed by the last session of the Indiana General Assembly, the Indiana State Board of Health has created a new division which will concern itself with the problems of advanced years. Indiana is probably the first state in the Union to have such a division, although there are several states undertaking some geriatric work, particularly in the prevention of deaths from cancer. The Indiana State Board of Health will provide facilities and personnel for research, investigation, and dissemination of knowledge to the public con-

cerning the health of persons of middle and advanced age.

A program designed to accomplish the following objectives is being planned: (1) to study the factors of life related to senescence and senility and the diseases and disabilities associated with advancing years; (2) to plan for the care and well-being of those whose advancing years entitle them to the best protection that medical knowledge and adequate care can provide; (3) to inform the public of all helpful knowledge concerning diseases and disabilities of advancing age, and to stimulate the interest of the medical profession in diseases of old age; (4) to co-operate with and assist both the lay public and professional groups in the full appreciation of the economic, social, and cultural value and usefulness of men and women who by reason of age and experience constitute a most important group of our population; (5) to be interested in laws, rules and regulations, conditions and requirements that may affect the well-being and usefulness of men and women in advancing years, and to seek improvement of such laws, rules and regulations, conditions and requirements as may affect the elderly adversely.

Census data show conclusively and dramatically that the increase in average age continues with each recurring census decade. The number of men and women in the State of Indiana who have attained the age of 60 or over is now in excess of 350,000, or approximately 10 per cent of the population. The number of this age group in the continental United States is estimated at about 13 million. Within the census decade 1930 to 1940 there was an increase of 35 per cent in the number of persons aged 65 or over, while in contrast the total population increase was but 7.2 per cent. The Census Bureau predicts that by 1980 more than two fifths of the population will be 45 and over.

## Prostatism

### Transurethral Resection in Quebec Hospitals. (La résection transurétrale chez nous.)

R. Cauchon. *Union méd. du Canada*, 74: 1370-72 (Oct.), 1945.

Between September 1940 and November 1944, 175 transurethral resections were performed by the author. Ten were repeated because the residual urine exceeded 60 to 75 cc. The oldest patient treated was 84 years old. Some patients were operated on for simple hypertrophy of the vesical neck, but in the majority of cases all the more or less pronounced symptoms of prostatism had been ascertained before operation; residual urine varied from 77 cc. to 2000 cc.

In certain cases rectal examination revealed a rather small tumor, whereas cystoscopy showed a much larger hypertrophy. One case of a patient with right hemiplegia seemed desperate, since previous cystotomy had been necessary because of chronic retention. However, even this patient recovered; micturition was normal and he regained the use of his limbs.

The preparatory examination varies little. It includes complete urinalysis, coagulation test, and test for azotemic uremia. Frequently a blood count is required. When renal function is impaired a test with phenosulfonephthalein is made, as well as a descending pyelograph. If the urine is not infected catheterization is avoided, because of the possibility of infection. Cystoscopy is preferred, and in fact is the routine procedure. Owing to this procedure and all possible care in the course of intervention, postoperative infections rarely occur.

As soon as the patient has returned to his bed, 1000 cc. of serum are in-

jected intravenously. Lavage with antipyrine is employed every 15 to 20 minutes during the first two hours, and later at longer intervals, according to the blood flow. Marion catheters, 22 F. or 24 F., are very satisfactory.

In most cases low spinal anesthesia has been employed; only 12 patients were given pentothal sodium. The size of the removed portion of the prostate varied from 1 gm. to 47 gm. in a single resection. Every patient is carefully catheterized during the days following ablation of the sound. If the patient suffers pain, 1/12 grain of heroin is administered.

None of the patients discharged from the hospital had more than 50 cc. of residual urine. The most dangerous possible complication during this type of operation is immediate hemorrhage during or following intervention.

The mortality amounted to 1.66 per cent during the past year. The time of hospitalization of cases without complications averaged 8 to 14 days.

**Endocrine Therapy in Advanced Carcinoma of the Prostate.**

R. FINKLER. *J. M. Soc. New Jersey*, 42: 322-25 (Oct.), 1945.

The relationship of endocrines to carcinoma of the prostate is well known. Animal tests made by Huggins and Clark showed that administration of androgens caused hyperplasia of prostatic epithelium and that estrogens or castration produced regression of hyperplasia. This procedure has been extended to human beings. An ever increasing number of patients with advanced prostatic carcinoma are being treated with orchiectomy or estrogenic therapy, or both. Prompt and spectacular relief is experienced from the typical symptoms, such as urinary obstruction, pain, anorexia, loss in weight and vitality, insomnia, and mental depression; there is also reduction in the level of serum acid phosphatase.

In untreated cases the average life expectancy was from 9 to 31 months. Since introduction of castration and estrogenic therapy as a means of palliative control of the progress of prostatic carcinoma with demonstrable metastases, life expectancy has been prolonged considerably.

The choice of type of therapy depends on the presence and degree of metastases, as estimated by clinical evidence, roentgenographic findings, and determination of serum acid and alkaline phosphatase. The normal upper limit is 3.5 units per 100 cc. of blood in acid serum phosphatase and 10 units per 100 cc. of blood in alkaline serum phosphatase; the acid serum phosphatase is by far the more important of the two.

It is advisable to employ estrogens and castration simultaneously, or to follow one with the other at the first indication of recurrence of original or metastatic carcinoma. The disadvantages of castration are necessity of hospitalization and a certain amount of shock and mental hazard. From the endocrine point of view, castration causes compensatory overactivity of the anterior pituitary, with resulting vasomotor disturbances, headache, and insomnia. It may also result in secondary and adrenal cortex overactivity.

Since adrenal cortex produces androgens, the effect of castration may be partially nullified; however, estrogenic therapy decreases androgenic activity of the testes and adrenal cortex. The therapeutic dose of 1 to 3 mg. is employed daily. In women its use may cause hyperplasia of mammary duct epithelium, but never breast carcinoma.

**Transurethral Prostatic Resection in Patients with Advanced Renal Insufficiency.**

L. F. GREENE AND G. J. THOMPSON. *J. Urol.*, 54: 166-73 (Aug.), 1945.

The introduction of the transurethral method of prostatic surgery has removed one of the chief contraindications to prostatic surgical treatment, namely, advanced renal insufficiency. Transurethral prostatic resection can be performed safely on patients suffering from advanced renal insufficiency, and these patients are no longer obliged to lead a "catheter life."

The important features of management are: (a) improvement or restoration of the acid-base metabolism by intravenous administration of suitable fluids and the treatment of anemia by blood transfusions; (b) maintenance of a urinary output of 2000 to 3000 cc. daily, thereby decreasing the nitrogenous waste products present in the blood; (c) drainage by urethral catheter for as short a period as possible—suprapubic cystotomy, with its attendant mortality, is not necessary; (d) operation at the first indication that the value for the blood urea is no longer falling but has become stabilized; (e) the resection should be finished within a period of 45 minutes, and must be complete.

The period of preoperative and postoperative hospitalization for patients suffering from advanced renal insufficiency is comparatively short. Longevity following prostatic resection among patients of this group warrants employing the procedure. Gastrointestinal symptoms due to renal insufficiency have all been relieved, despite the fact that renal function may remain impaired.

7 tables.

**Transurethral Resection for Prostatic Hypertrophies of Large Size.**

REED M. NESBITT. *Surg., Gynec. & Obst.*, 81: 515-20 (Nov.), 1945.

An evaluation of clinical data on 176 patients with "large" prostates, the youngest of whom was 48, the oldest 88, treated by transurethral resection at the University of Michigan Hospital, discloses that gland size is not a determining factor in morbidity, mortality, or length of hospital stay. Comparison of data for this group of cases with those for all benign cases reveals that blood losses are greater when large glands are resected, and that, as a result, postoperative transfusions are more often required; also, that external urethrotomy is done more frequently in this group of cases (33.5 per cent) than in all resection cases (20 per cent).

The end results following transurethral resection in this group of cases are considered excellent; in only one case was the result poor. The end results in patients who had more than 80 grams of tissue removed were just as good as in other patients of this group.

These results support an impression that has long prevailed among experienced resectionists, namely, that patients with "large" glands enjoy just as good results following proper resection as do patients having smaller prostates, and that the quality of end result following transurethral resection is determined, not by the size of the prostate, but by the adequacy of its removal.

Of 176 patients, 93 stated that they had sustained no change in potency following resection, while 28 had less and 24 an increase in sexual vigor; this datum was not ascertained for the rest.

In 100 consecutive cases 24 reported an increase in sexual potency, and 10 a decrease; the remaining patients observed no change.

6 tables.

**Advanced Cancer of the Prostate.**

A. L. PARLOW. *M. World,* 63: 359-60 (Aug.), 1945.

Five years ago Huggins—who had made animal tests regarding the effects of administration of androgens and estrogens on production of prostatic secretion and had found that androgens activated prostatic epithelium and increased the flow of prostatic secretion, while estrogens stopped the flow and showed a resultant regression of epithelial cells—began to castrate men with advanced cancer of the prostate, and reported excellent clinical improvement.

This result was confirmed by some investigators, while others were sceptical, but all agreed that primary and metastatic lesions regressed through this treatment and that life could be prolonged. Disappearance of pain and urinary distress is the usual result of orchiectomy. In some cases large amounts of diethylstilbesterol are administered successfully. In many patients, however, the improvement is only temporary. Regression of carcinoma is said to be more complete in castrated patients than in those treated with diethylstilbesterol.

Cases of advanced carcinoma of the prostate treated by orchiectomy may be divided into cases of: (1) complete failure (composed of undifferentiated type of carcinoma); (2) partial failure (with temporary relief of symptoms and no uniform arrangement of the carcinoma); (3) delayed failure (cases of well-differentiated adenocarcinoma; disappearance of primary cancer and metastatic nodules not permanent); and (4) no reactivation of the carcinoma.

Early recognition and complete removal of prostatic carcinoma offer the only hope of completely eradicating the disease. The author suggests that radical perineal prostatectomy be performed when cancer is proved through previous orchiectomy to have regressed to within the confines of the capsule of the prostate.

**Nonspecific Chronic Prostatic Conditions.**

P. S. ROSENBLUM. *M. World,* 63: 399-400 (Sept.), 1945.

Nonspecific chronic prostatitis is a relatively prevalent ailment affecting about 25 per cent of adult males. It is nearly always associated with chronic seminal (prostato-) vesiculitis. Infection of the prostate gland may occur: (1) as an extension from nonspecific urethritis, by downward extension from chronic pyelonephritis; (2) through the blood stream, following influenza, pneumonia, or typhoid fever; (3) from distant foci of infection (teeth, tonsils, sinuses, etc.); (4) from trauma caused by instrumentation or chemicals; and (5) from contact with nonspecific vaginal discharges and trichomonas vaginal infection.

The prostate gland receives nerve fibers from the 10th, 11th, and 12th dorsal, 1st, 2d, and 3d sacral, and 5th lumbar vertebrae; hence the large variety of pains encountered in this disease. Obstructions at the vesical neck, in the form of bars and contractures. are the result of long-standing infections. Early recognition and treatment are urged. The true condition of the gland is often revealed only after the second or third examination.

Massage is still the most valuable

single measure. Rest periods should be given between the courses of massage. The concomitant posterior urethritis should be treated by sounds and dilatation. Occasionally topical applications may become necessary. Hot or cold rectal irrigations and diathermy may give marked symptomatic relief. In persistent cases search for other foci of infection is essential. Proper employment of the sulfa group and penicillin, when dealing with susceptible organisms, has definitely shortened the course of this disease in many cases under observation.

**Suprapubic Prostatectomy: A Revised Operation.**

I. J. ZIMMERMAN. *J. Urol.*, 54: 174-76 (Aug.), 1945.

Since its inception, the suprapubic operation for the relief of prostatic obstruction has undergone many modifications. Careful investigation and evaluation of the patient, proper preoperative care, including hydration and drainage, together with vigilant postoperative care, have made prostatic surgery relatively safe.

The operation consists of two stages: (1) a modified trocar cystotomy, and (2) a suprapubic prostatectomy employing a new technique in the method of approach.

Unlike urethral catheter drainage, trocar drainage is comparatively comfortable, even in the presence of stone. The drainage is good; bleeding from the prostate and the disconcerting infections occurring with the urethral catheter are avoided.

The time allowed to elapse between the first stage and the prostatectomy depends on the patient's condition and progress. It should not exceed one week. In the prostatectomy a urethral or suprapubic type of hemostatic bag is introduced with a No. 30 suprapubic mushroom tube. In 10 hours the mild tensior of the bag is released, and in 24 hours it is removed, together with the tube, and urethral catheter drainage is applied.

The average blood loss sustained during prostatectomy is 56 cc.; the postoperative blood loss averages 159 cc.

The patient is ambulatory for one to three days. Healing is rapid, because tissues are disturbed very little and coaptation of the edges of the incised bladder is attained without the aid of sutures. The hospital stay rarely exceeds 14 days and is frequently as short as 10 days.

1 figure.

**The Diagnosis and Treatment of Chronic Prostatitis Associated with Non-Specific Urethritis.**

H. G. COOPER and J. T. MACLEAN. *Bull. Vancouver M.A.*, 1944-45, 21: 304-9 (Sept.), 1945.

The cases under observation were divided into three groups: (1) those with previous gonorrheal urethritis; (2) those with history of previously diagnosed nonspecific urethritis; and (3) those without previous history of urethritis. A urethral discharge was present in 85 to 91 per cent in cases in groups 1 and 2, and was the presenting symptom in 70 per cent. It was the presenting symptom in only 21 per cent of cases in which urethritis, urinary frequency, terminal hematuria, backache, and vague perineal discomfort were frequent symptoms. Pyuria without symptoms was present in 28 per cent of group 3 cases.

Alcoholic and sexual excess are predisposing factors, since they lower the resistance of the urethra and prostate and favor subsequent invasion by or-

ganisms from the host which are normally nonpathogenic. Other factors are exacerbation of previous prostatitis, with some residual infection present, and organisms from a carrier, which may be pathogenic or not to the carrier. Staphylococci were ascertained in 55 cases of 100; diphtheroids in 10; staphylococci in combination with micrococci, streptococci, and trichoma in 32.

Diagnosis was made by presence of urethral discharge, three-glass urinalysis, and examination of prostatic fluid. Prostatic palpation is not indicative. Treatment with stilbestrol, urethral irrigations, sulfonamides, 100,000 units of penicillin, and pelvic diathermy were all found to give unsatisfactory results. Penicillin in doses of 25,000 units every four hours for 14 days produced "apparent cure" in 75 per cent; the remaining cases were improved. Symptomatic improvement occurred on the fifth to tenth day, usually the seventh. Decrease in number of pus cells in the prostatic fluid coincided with the symptomatic improvement. Stilbestrol therapy was discontinued because the number of pus cells in the prostatic fluid was not materially reduced, and administration over a certain period will result in sterility. In some temporary failures penicillin is given intramuscularly and sulfathiazole with methylene blue is administered orally.

In smears of urethral discharge or prostatic fluid a large monoform cell is frequently observed. It is believed to be an intermediate stage of the pathogenic organism present in the individual.

Urethroscopy has been carried out on a gradually increasing number of patients.

The anterior urethra is nearly always entirely normal in these cases. The urethral discharge is probably due to the prostatitis, which causes excessive inflammatory prostatic secretion, rather than to true urethritis. On this basis cases previously diagnosed as nonspecific urethritis may be open to question.

4 tables.

**Hypertrophy of the Prostate and Its Problems.**

J. Atila Rocha. *Rev. méd. Paraná,* 13:43-44 (March-April), 1944.

The clinical and therapeutic problems of hypertrophy of the prostate, which have recently been reagitated, constituted for a long time merely a serious problem of pathogenesis, rather than a matter of treatment.

In 1806 Home described exactly the median lobe of the prostate; later Mercier discussed the periurethral nature of what he called "hypertrophy of prostatic valves." At the same time Civiale studied urethrovesical valves or "barriers" and distinguished between total hypertrophy of the prostate and that of Home's median lobe. He studied the consequent urethral deformations and transformations of the vesical walls and called attention to renal disturbances secondary to prostate obstruction.

Freyer introduced suprapubic prostatectomy. He himself was of the opinion that through this operation the entire gland was removed; he confused the capsule of the adenoma with the capsule of the gland. Wallace found that Freyer's pseudocapsule was the gland itself. Later work confirmed the periurethral nature of the adenomas.

In 1919 Papin and Verliac demonstrated anatomically that Freyer's prostatectomy removed only the periurethral tumor, leaving the atrophied pros-

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tate in place; their view thus agreed with the modern theories on this affection. In referring to the senile prostate they show that the prostatic gland proper differs embryologically from the periurethral glands, whose development in the fetus stops early, while that of the prostate continues. In old age the prostate atrophies and the exaggerated development of the periurethral glands is reinitiated. Papin and Verliac, although noting this coincidence, could not explain it even in 1919, although in 1897 McEvan had attributed a regulatory action on the prostatic gland to the internal secretion of the testicles.

Today the predominant theory is that of hormonal origin. Clinical and experimental confirmations are being added daily; the synthesis of testosterone offers a secure basis for these theories.

**Retropubic Prostatectomy; a New Extravesical Technique. Report on 20 Cases.**

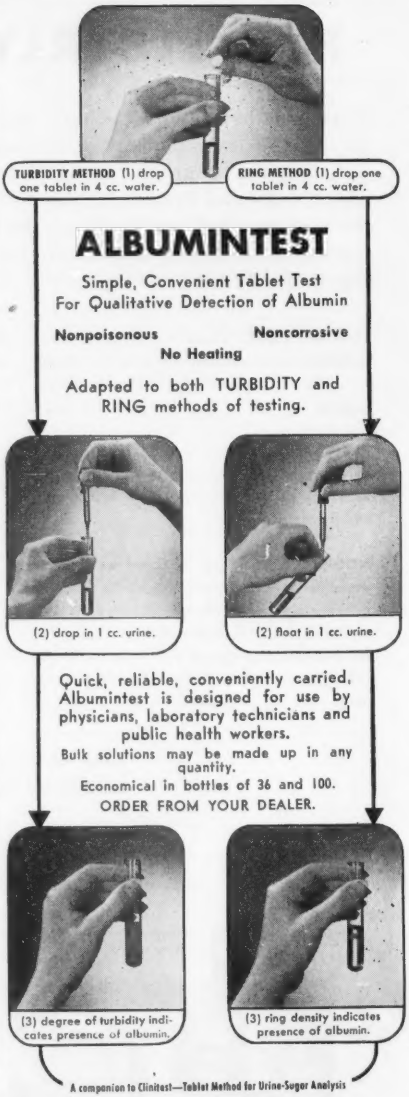
TERENCE MILLIN. *Lancet*, 2:22: 693-96 (Dec. 1), 1945.

A preliminary report of a new operative approach to prostatic surgery is presented. The operation appears to be applicable to all types of obstructing prostate. In the twenty consecutive cases there has been no death.

The features of this operation are: It is an extravesical procedure, thus avoiding suprapubic bladder drainage, with its risk of developing slow-closing or persistent fistulae. It is relatively short and shock-free.

The intervention appears to be anatomically sound, for no important organs are interfered with or endangered. The whole of the obstructing tissue is removed, so that the risk of recurrent obstruction is obviated.

In the course of the operation the anterior aspect and many of the lat-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1. E. W. Roberts, Urol. & Cutan. Rev., 47:286, 1943
2. F. E. Lane, West. J. Surg., 52:313, 1944

eral aspects of the false capsule are exposed; an inverted V incision is carried down to the adenoma, which is readily recognized by its typical whitish appearance. The V-shaped flap is elevated, and a lozenge-shaped space is thus opened up. Then the lower margins of the lateral lobes are freed from the false capsule. The lateral lobes and, when present, the middle lobe, are freed digitally from below upward until they present in the wound, since they are attached solely in the region of the bladder neck. The pedicle is seized on each side with Kocher forceps, and the adenomatous mass is detached with scissors or the diathermy needle.

A method of exposure described enables the surgeon to see small adenomata frequently left behind during enucleation; they are detached with scissors. The postoperative course for patient and nursing staff has been remarkably easy and relatively devoid of anxiety for the surgeon. Postoperative stay in the hospital seldom exceeds two weeks.

4 figures, 1 table.

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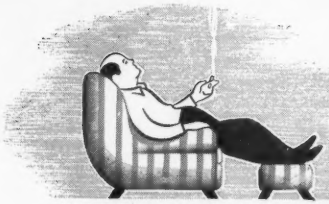

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*Cahill, W. M., Schroeder, L. J. and Smith, A. H.: Digestibility and biological value of soybean protein in whole soybeans, soybean flour, and soybean milk, J. Nutrition, 28:209, Sept. 1944.

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